SOUTHERN AFRICAN CUMACEA

PART 4

FAMILIES GYNODIASTYLIDAE AND DIASTYLIDAE

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(With 30 figures and 3 tables)

[*MS. accepted 19 March 1980*]

ABSTRACT

The genera *Gynodiastylis*, *Dicoides*, *Allodiastylis*, *Sheardia*, *Zimmeriana*, and the new genus *Haliana* are removed from the Diastylidae and placed in the reinstated family Gynodiastylidae Stebbing, 1912. The family is confined to shallow waters of the Indo-West-Pacific region.

In southern Africa the Gynodiastylidae are represented by seven species in three genera. The genus *Haliana* is new, as are the species *Haliana eckloniae*, *Dicoides siphonatus*, *Gynodiastylis sulcatus*, *G. curvirostris*, *G. profundus*, *G. lineatus*, and *G. fulgidus*. All are described and figured.

The southern African Diastylidae are represented by 18 species in 6 genera. 2 further species are known from deep waters of the Cape Basin. 16 species are described and figured. 12 of these are new, namely *Dic formosae*, *D. platytelson*. *Vemakylindrus stebbingi*, *Makrokylindrus spinifer*, *M. deinotelson*, *M. mundus*, *M. bicornis*, *M. aculeatus*, *Diastylis namibiae*, *Leptostylis gilli*, *L. attenuatus*, and *L. faurei*.

Vemakylindrus is elevated from subgeneric to generic rank. Adults of *Dic* are described for the first time and the males are shown to have two pairs of pleopods.

Keys are given to the southern African Gynodiastylidae and Diastylidae, the genera of these two families, *Dicoides*, the species of *Gynodiastylis* described since 1946, *Dic*, *Vemakylindrus*, *Makrokylindrus*, and the species of *Diastylis* and *Leptostylis* from the southern hemisphere.

The distribution of the Diastylidae is discussed; the family appears to predominate in temperate latitudes and occurs widely at all depths below the intertidal zone. Although the southern African Diastylidae are mainly deep-water forms, there are a few very successful shallow-water species, including *Diastylis algoae*, the most abundant of all local cumaceans.

The species diversity is low and the rate of endemism appears to be 100 per cent.

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Ann. S. Afr. Mus. **82 (6)**, 1980: 187–292, 30 figs, 3 tables.

INTRODUCTION

This is the fourth in a series of papers on the systematics and distribution of the Cumacea of Africa south of 20°S. The first three papers dealt with the Vaunthompsoniinae (Day 1975), the Bodotriinae (Day 1978*a*) and the Lampropidae and Ceratocumatidae (Day 1978*b*). A brief discussion of the structure and terminology of the group is included in the first paper.

References to diastylids in these waters are scanty and no gynodiastylids have previously been reported. Nine diastylids have been described, *Diastylis algoae* Zimmer, 1908, *Diastylis rufescens* Jones, 1955, and *Dic calmani* Stebbing, 1910, from depths of less than 100 m; *Diastylis hexaceros* Zimmer, 1908, *Makrokylindrus fragilis* Stebbing, 1912, *M. acanthodes* (Stebbing, 1912) (as *Adiastylis acanthodes*), and *Leptostylis macruroides* Stebbing, 1912, from depths between 500 and 800 m; and *Makrokylindrus wolffi* Băcescu, 1962, and *M. lomakinae* Băcescu, 1962, from 4 885 m in the Cape Basin.

MATERIAL AND STATION DATA

Most of the shallow-water material used in this study was obtained by the Zoology Department of the University of Cape Town (UCT) during a survey of the benthic fauna round the South African coast, the programme being funded by the Oceanographic Research Institute of the University and the Council for Scientific and Industrial Research (CSIR). Almost all of the deep-water material was lent by the South African Museum (SAM), mostly collected by the R.S. *Pieter Faure* between 1898 and 1907, and by the R.V. *Meiring Naude* in 1976 to 1977. Valuable additional material from Natal was lent by the National Institute for Water Research (NIWR) of the CSIR in Durban. Material from South West Africa was lent by the Sea Fisheries Branch, Cape Town.

Because of the very large number of samples, exact station data are provided only for holotype material; in all other cases only extremities of range

and depth are given for each area and/or source of material. Both the areas and the sources of material are designated by code letters which are shown, together with their geographic limits, in Table 1 and Figure 1.

METHODS

Collecting: the majority of material came from benthic sampling programmes using dredges (SAM, UCT, NIWR), grabs (UCT, NIWR) or a diver-operated suction-sampling device (a few shallow-water UCT samples). All material provided by the Sea Fisheries Branch was collected by plankton nets of varying mesh size.

Length measurements were made from the anterior tip of the carapace to the posterior tip of the telson, the uropods being excluded in all cases.

KEY TO THE SOUTHERN AFRICAN GYNODIASTYLIDAE AND DIASTYLIDAE

This key is designed for the identification of immature and damaged animals of both sexes. It is, therefore, based on the more robust parts of animals and is not as rigorous as the keys to individual genera and species, which should be consulted for final identification. The key *does not* distinguish between local species and those from other parts of the world.

1 One or two sharp transverse ridges on, or directly behind, frontal lobe of carapace, continuing to ventrolateral edge (Figs 10A–B, 16A–B, K) except in some males (Figs 11A, 13A) 2

– No transverse ridges on or behind frontal lobe of carapace 6

2 Transverse ridges and/or their anterior extensions bearing spines or evidence of their insertion (Figs 16B, 17B) 3

– Carapace entirely devoid of spines 4

3 One transverse ridge on carapace; telsonic somite hardly produced between uropods *Makrokylindrus fragilis* (Fig. 16)

– Two transverse ridges on carapace; telsonic somite produced between uropods for nearly half its length .. .. *Makrokylindrus deinotelson* (Fig. 17)

4 Transverse ridges on carapace entire in dorsal view, one across and one posterior to frontal lobe; at least a third of telson post-anal .. .. *Dic platytelson* (Fig. 14)

– Transverse ridges on carapace interrupted by frontal lobe in dorsal view and none situated posterior to it (Fig. 10B); an insignificant part of telson post-anal 5

5 Carapace finely hairy; last pedigerous somite rounded posteriorly in male; anal valves directed almost ventrally; telson shorter than uropods in female *Dic calmani* (Figs 10–11)

– Carapace not hairy; last pedigerous somite pointed posteriorly in male; anal valves directed posteriorly; telson longer than uropods in female *Dic formosae* (Figs 12–13)

6 Integument smooth with no trace of spines, spinules, denticles or tubercles, even at anterolateral edge of carapace (which may be minutely scalloped – Fig. 9A) .. 7

– Integument tuberculate or with spines at least at anterolateral edge of carapace (Fig. 21A), usually with spines or denticles elsewhere 14

7 Carapace longitudinally concave middorsally (Fig. 4A–B) 8

– Carapace flat or convex middorsally 9

8 Female without exopods on thoracic limbs; dorsolateral edge of middorsal concavity interrupted at level of eyelobe (male unknown) .. .. *Haliana ecklonia* (Fig. 9)

– Female with exopods on pereiopods 1 and 2; dorsolateral edge of middorsal concavity uninterrupted in both sexes .. .. .. *Gynodiastylis sulcatus* (Figs 3–4)

9 Carapace with three or more pairs of longitudinal grooves or ridges (may be difficult to distinguish in newly-moulted individuals) 10

TABLE 1

Code letters of the survey programmes and their geographical ranges.

Institute	*Area*	*Explanation*	*Geographical position*
UCT		*University of Cape Town*	
	SWD	South West Africa benthic survey	Cape Cross (21°S 13°E) to Orange River mouth (28°S 16°E)
	WCD	West Coast benthic survey	Orange River mouth (28°S 16°E) to Cape Point (34°S 18°E)
	LBT	Lambert's Bay benthic transect	Lambert's Bay, shore—800 m (32°S 18°E–32°S 17°E)
	SB	Saldanha Bay benthic survey	Saldanha Bay (33°S 17°E)
	FAL	False Bay benthic survey	False Bay (34°S 18°E)
	FBY	False Bay benthic transect	False Bay, shore—100 m
	CP	Cape Peninsula—intertidal	33–34°S 18°E
	SST	Still Bay benthic transect	Still Bay, shore—200 m (34°S 21°E–35°S 22°E)
	SCD	South coast benthic survey	Cape Point (34°S 18°E) to Umtamvuna River mouth (31°S 30°E)
NIWR		*National Institute for Water Research*	
		Natal coast benthic survey	Umtamvuna River mouth (31°S 30°E) to Kosi Bay (26°S 32°E)
SAM, SM		*South African Museum*	Various (see records of individual species for details)
FISH		*Sea Fisheries Branch*	South West Africa: plankton

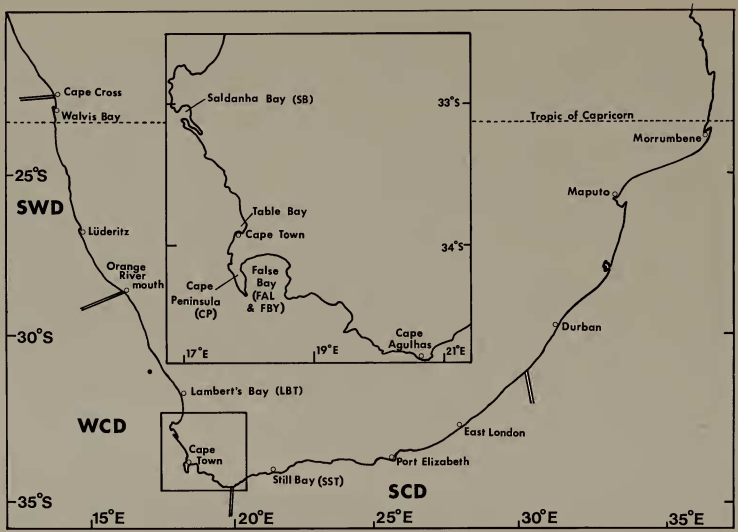

Fig. 1. Africa south of 20°S. *Inset:* south-western Cape. See Table 1 for details of code letters.

– Carapace with no trace of longitudinal grooves or ridges unless on pseudorostrum .. 11
10 Three or four pairs of shallow longitudinal grooves on carapace; siphon more than half as long as carapace (but may be damaged or missing); telson twice as long as wide *Dicoides siphonatus* (Fig. 2)
– Ten to twelve pairs of sharp longitudinal grooves on carapace; siphon less than a quarter as long as carapace; telson no longer than wide *Gynodiastylis lineatus* (Fig. 7)
11 Pedigerous somites 3 and 4 coalesced dorsally; telson tubular, more than twice length of telsonic somite .. .. *Makrokylindrus mundus* (Fig. 18)
– Pedigerous somites 3 and 4 not coalesced; telson flattened and no longer than telsonic somite (Fig. 5G) 12
12 Pseudorostral lobes flanged dorsolaterally from anterior tip to eyelobe; integument of carapace usually finely striate .. .. *Gynodiastylis profundus* (Fig. 6)
– Pseudorostrum not flanged; integument of carapace not striate 13
13 Pseudorostrum curving strongly downwards; setae of propodus of pereiopod 1 much longer than basis .. .. *Gynodiastylis curvirostris* (Fig. 5)
– Pseudorostrum roundly truncate anteriorly, not curving downwards; setae of propodus of pereiopod 1 much shorter than basis .. .. *Gynodiastylis fulgidus* (Fig. 8)
14 Pseudorostrum strongly upturned and more than half as long as rest of carapace *Vemakylindrus stebbingi* (Fig. 15)
– Pseudorostrum hardly or not upturned and less than a third as long as rest of carapace 15
15 Pre-anal part of telson distinctly longer than telsonic somite; tubercles or large spines present dorsally on pedigerous somites (Fig. 21A) and/or carapace 16
– Pre-anal part of telson no longer than telsonic somite; large spines absent or present in one or two rows at anterolateral edge of carapace (small scattered denticles may occur) 22
16 Telson at least as long as last three abdominal somites together, tubular, with very short post-anal part; entire body densely covered with long spines *Makrokylindrus spinifer* (Figs 19–20)
– Telson subequal in length to last two to two and a half abdominal somites together, with a fifth or more of its length post-anal (Fig. 21A); spines or tubercles on body short, scattered or very sparse 17
17 Carapace with one or more pairs of large anterolateral horns (Fig. 21B); few spines on body, all confined to dorsal region of pedigerous and abdominal somites .. 18
– Carapace without anterolateral horns; many spines or tubercles on body (many may be damaged or lost—Fig. 22A) 19
18 Carapace with three pairs of large anterolateral horns; half of telson post-anal *Diastylis hexaceros*
– Carapace with one pair of large anterolateral horns; less than a quarter of telson post-anal .. .. *Makrokylindrus bicornis* (Fig. 21)
19 Carapace unevenly contoured with each major spine on an individual protuberance; telson distinctly shorter than peduncle of uropods in both sexes *Makrokylindrus acanthodes* (Fig. 22)
– Carapace evenly contoured with many short spines (Fig. 23A) or blunt tubercles; telson of female longer than peduncle of uropod; telson of male (where known) very slightly shorter 20
20 Pre-anal part of telson (that part proximal to anterior edge of anal valves) twice length of remaining part; first segment of antenna 1 one and a half times length of next two together .. .. *Makrokylindrus wolffi*
– Pre-anal part of telson hardly longer than remaining part; first segment of antenna 1 subequal in length to next two together 21
21 Last three segments of pereiopod 2 subequal in length; post-anal part of telson a quarter width of pre-anal part, apparently lacking lateral and terminal spines *Makrokylindrus lomakinae*
– Carpus of pereiopod 2 subequal in length to propodus and dactyl together; post-anal part of telson half width of pre-anal part with 3–4 pairs of lateral and one pair of terminal spines .. .. *Makrokylindrus aculeatus* (Fig. 23)
22 Peduncle of uropod about as long as telson; telson twice length of telsonic somite with seven or more pairs of lateral spines; carapace about twice as long as deep *Diastylis algoae* (Figs 24–25)

– Peduncle of uropod at least a third as long again as telson; telson much less than twice length of telsonic somite (Fig. 26K) with no more than six pairs of lateral spines; carapace usually much less than twice as long as deep 23

23 Telson slightly longer than telsonic somite and only a little shorter than peduncle of uropod; about six pairs of lateral spines in female and two in male *Diastylis namibiae* (Fig. 26)

– Telson subequal in length to or shorter than telsonic somite and about half length of peduncle of uropod with no more than three pairs of lateral spines in male or four in female 24

24 Antenna 1 at least half as long as carapace; carpus of pereiopod 2 longer than basis *Leptostylis attenuatus* (Fig. 30)

– Antenna 1 much less than half length of carapace; carpus of pereiopod 2 shorter than basis 25

25 Crenulate ventrolateral carina present above crenulate or serrate ventrolateral edge of carapace .. .. *Leptostylis macruroides*

– No ventrolateral carina present above ventrolateral edge of carapace 26

26 First segment of endopod of uropod nearly twice length of next two together; carapace often with several shallow, transverse depressions laterally *Leptostylis gilli* (Figs 27–28)
First segment of endopod of uropod subequal in length to next two together; carapace with no transverse depressions .. .. *Leptostylis faurei* (Fig. 29)

THE FAMILIES GYNODIASTYLIDAE AND DIASTYLIDAE

The first attempt to group genera of Cumacea into families was made by Sars (1879), who arranged the 18 known genera into 8 families; 3 more families were added by 1912 (one each by Sars in 1900, Calman in 1904, and Stebbing in 1910), by which time the number of genera had risen to 51. In 1912, in a paper on South African Cumacea, Stebbing added 11 new genera, 6 of which still stand, and 13 new families. In his monograph on the world Cumacea in 1913 he added another family, bringing the total to 26. Due to the fact that 17 of these contained only 1 genus (and some a single species at that) and because of the artificial separation of closely related genera, Zimmer (1941) reduced the number of families to 7, including 4 of those originally proposed by Sars. This system has been generally accepted by most workers ever since.

Without wishing to advocate the return to a system as complicated and artificial as Stebbing's, it seems appropriate at this stage to reconsider the familial position of the Diastylidae in the presence of a large and diverse collection of material.

The family as it stands is far more variable than any except perhaps the Lampropidae, where at least the spination of the telson is quite distinctive, and the Nannastacidae (which will be considered in a later paper). There is no distinctive character or group of characters or even a 'diastylid facies' by which a member of the family may be recognized. However, within the Diastylidae there is a group of six genera which are very closely related to each other, since they have a characteristic form and are quite unlike most of the other Diastylidae. They are *Gynodiastylis* Calman, 1911, *Allodiastylis* Hale, 1936, *Sheardia* Hale, 1946, *Dicoides* Hale, 1946, *Zimmeriana* Hale, 1946, and *Haliana* gen. nov. It is proposed that these genera are removed from the Diastylidae and that Stebbing's (1912) family Gynodiastylidae be reinstated to accommodate them. This becomes possible in the light of more detailed

information about *Dic* which is now available (p. 225). It should be pointed out that when Zimmer revised the families of Cumacea in 1941, there were only 10 species in 2 genera, which would hardly have justified the maintenance of a separate family. The 6 genera now known contain 56 species, which makes the family larger than the Pseudocumatidae and the Ceratocumatidae. A further justification is that familial boundaries are arbitrary for the most part, and reduction of the diagnostic characters of the diastylids should assist in placing animals in the correct family at least, which is often the most difficult step in identification. Furthermore, the gynodiastylids appear to be a phylogenetically distinct group showing no more obvious affinities with the diastylids than with any other family.

The majority of other genera of the diastylids do resemble each other, and can now be seen to show the 'diastylid facies'. They are active, rather delicate, lightly calcified animals with quite a large cephalothorax clearly divided from the abdomen, and generally with a well-developed telson and long, slender uropods. There are exceptions, but the family becomes much more uniform on exclusion of the gynodiastylids. Although still variable, the restricted family no longer has vastly aberrant genera. Variations within the family are discussed in the remarks on page 220.

Family **Gynodiastylidae** Stebbing, 1912 (comb. nov.)

Diagnosis

Antenna 1 of male without numerous sensory setae. Flagellum of antenna 2 of male very short, not reaching posterior edge of carapace; segments short and usually less than fifteen in number. Mandibles of normal boat-shape. Branchial filaments undivided. Exopod present on maxilliped 3 of male, absent in female. Exopods present on first two, three or (usually) four pereiopods in male; absent, or present only on first two pereiopods in female, or present on first two and rudimentary on next two. Male without pleopods. Telson shorter than telsonic somite with less than half length post-anal, or longer than telsonic somite with an insignificant portion post-anal; usually unarmed, sometimes with one pair of terminal spines and never more than two pairs of small lateral spines. Endopod of uropod 1-, 2- or 3-segmented.

Type genus

Gynodiastylis Calman, 1911.

Remarks

The family consists of six genera. Three are known only from Australia, namely *Allodiastylis* Hale, 1936, *Sheardia* Hale, 1946, and *Zimmeriana* Hale, 1946. *Gynodiastylis* Calman, 1911, is widely known from the Indo-West-Pacific, *Dicoides* Hale, 1946, from Australia and South Africa, and *Haliana* gen. nov. from South Africa.

The genera are morphologically similar, the main distinguishing features being the number of uropods on the thoracic limbs of the female and the

nature of pereiopod 1. *Allodiastylis* (with four species) and *Sheardia* (with one) are very similar in the nature of the large first antennae, but the former lacks exopods on all the thoracic limbs in the female and the pseudorostrum is bent upward in the female and downward in the male. Pereiopods 1 and 2 of the females of *Sheardia* possess exopods and the pseudorostrum is straight. No males of this genus were previously available, but the author has recently received some Australian material from the Great Barrier Reef, including two adult males which appear to belong to this genus and probably to Hale's species. They are typical of the family, with no pleopods and five pairs of exopods on thoracic limbs. The pseudorostral lobes are very short and the exhalant siphon is strongly directed dorsally. *Zimmeriana* (with three species) and *Dicoides* (with five) are also very similar to each other in the enormous development of the first pereiopod, but the former lacks exopods in the female and the dactyl bears a number of long setae, while in *Dicoides* exopods are present on the first four pairs of pereiopods in the female and the dactyl of the first pereiopod lacks long setae. *Gynodiastylis* is by far the largest, the most variable and the most widespread genus with forty-two species. It is characterized by exopods on pereiopods 1 and 2 of the female while the propodus of pereiopod 1 is relatively short and usually bears a number of very long setae.

One new genus is erected here for four individuals of a species which, although very similar to a local species of *Gynodiastylis*, lacks exopods on all thoracic limbs in the female; the male is unknown. It is close to *Zimmeriana*, but the propodus and not the dactyl of pereiopod 1 bears long setae. Since the two genera are clearly mutually exclusive, the species, which bears features characteristic of both, has to be accommodated in yet another genus to avoid a complicated overlapping of generic characters. The new genus is named *Haliana* after H. M. Hale, the Australian carcinologist who has contributed by far the most to our knowledge of this family.

Adaptive features

Most members of the family are small, compact, usually well chitinized animals, often with bizarrely developed first pereiopods. There are a number of interesting and unusual features about the group which suggest functional adaptations. In most there is sufficient reduction of appendages to suggest that they are more sedentary than the majority of cumaceans. It is usual in this order that when pleopods are reduced in number or absent, the thoracic exopods are particularly well developed to facilitate swimming in the male. But in the gynodiastylids the thoracic exopods are not particularly well developed in the male and are sometimes even reduced in number. Exopods when present in the female are also very small. This together with the often enormous size of the first pereiopods makes it difficult to visualize many of these animals ever being able to leave the substrate. (There are, however, several records of plankton samples, although in all cases the depths were not very great (Hale 1946).) It is not only the external morphology which suggests

reduced mobility. The respiratory surfaces are small, since the branchial filaments are not at all divided. This in turn suggests a rather low respiratory rate and a consequent reduction in activity. The majority of animals are small, the average length being about 3 mm: only three species are longer than 6 mm. It does not seem possible on the available evidence to say whether the small size is the cause or the effect of a small respiratory surface, or indeed whether the two factors are directly linked; but the coincidence suggests that they may be.

One would expect the disadavantages of possessing extraordinarily large first pereiopods to outweigh the advantages. They must therefore be of particular functional significance, although what this may be is not readily apparent. In some, such as *Dicoides areolata*, these appendages appear to be far too cumbersome to be manipulative in function, while in many species of *Gynodiastylis* the setae of the propodus could either function as a sieve or as a brush. Now in filter-feeding types such as *Diastylis*, the substrate is stirred up by means of the exopods of the third maxillipeds. But the females of *Zimmeriana*, *Allodiastylis* and *Haliana* have no thoracic exopods, although the first pereiopods are large. It is therefore suggested that at least some of these animals use the first pereiopods to stir up the mud and to push it towards the mouthparts where it can be filtered or scraped clean. *Haliana*, living in the holdfasts of kelp, may, in fact, employ a rather unusual method of feeding, since the amount of sand and detritus in the holdfasts is not great. Hale (1946) further mentions that a specimen of *Zimmeriana longirostris* was found in which the last two segments of the first pereiopod were reflected backward, forming a shield covering the mouthparts.

The uropods and telson are relatively small, robust and sparsely setose, and the post-anal part of the telson is relatively short. Thus these parts would appear not to be of great value in cleaning, and, indeed, there are few setose regions requiring this; their robustness perhaps assists in anchorage in the substrate. Generally those with unarmed telsons have at least some well-developed spines on the uropods—perhaps for cleaning purposes.

The adult males generally display few of the secondary sexual characters which usually distinguish such individuals from immature males or from females. For example, the first antenna does not bear a brush of sensory setae, the flagellum of the second antenna is very short (although setose), the exopods of the thoracic limbs are often reduced in size or number and the pleopods are absent. It almost appears that the males are neotenic.

KEY TO THE GENERA OF THE GYNODIASTYLIDAE

The following key is adequate for adults and most juveniles. Since the major distinction between several of the genera depends on characters of the first pereiopod, when this is absent or damaged it may not be possible to determine the genus.

1 Antenna 1 large, third segment subequal in length to, or longer than, first two together 2
– Antenna 1 of small or moderate size, third segment shorter than first two together .. 3

2 Female with exopods on pereiopods 1 and 2; endopod of uropod of female 3-segmented and of male 2-segmented; pseudorostrum of female straight with exhalant siphon anteriorly directed, of male very short with exhalant siphon dorsally directed *Sheardia* Hale, 1946
– Female with exopods absent from pereiopods 1 and 2; endopod of uropod 2-segmented in both sexes; pseudorostrum bent upwards in female and downwards in male *Allodiastylis* Hale, 1936
3 Pereiopod 1 very large, propodus much more than half length of basis and never with a brush of long setae 4
– Pereiopod 1 of moderate size, propodus small, about half length of basis or less and frequently with a brush of long setae masking the small dactyl 5
4 Exopods absent from thoracic limbs of female; dactyl of pereiopod 1 distally bearing numerous setae longer than itself .. .. *Zimmeriana* Hale, 1946
– Exopods present on pereiopods 1–4 of female (rudimentary on 3 and 4); dactyl of pereiopod 1 distally bearing few setae not longer than itself .. *Dicoides* Hale, 1946
5 Exopods absent from all thoracic limbs of female (male unknown) .. *Haliana* gen. nov.
– Exopods present on pereiopods 1 and 2 of female, and on at least pereiopods 1 and 2 of male (usually 1–4) .. .. *Gynodiastylis* Calman, 1911

Dicoides Hale, 1946

Generic diagnosis

Antenna 1 small or moderate in size. Pereiopods 1 to 4 with exopods in both sexes. Propodus of pereiopod 1 longer than basis in female, more than half length of basis in male; carpus no shorter than propodus. Telson subcylindrical with no distinct post-anal or lateral spines; terminal spines short or absent. Endopod of uropod 3-segmented.

Type species

Dicoides brevidactylus (Hale, 1937*a*) (as *Dic brevidactylum*) from Australia.

Remarks

The genus is rather uniform apart from the variable nature of the first pereiopods, which are none the less always very large. The relatively small propodus of the first pereiopod in *D. siphonatus* sp. nov. has required a slight alteration in the generic diagnosis.

Distribution of Dicoides

Four species are known from Australia at depths between 70 and 87 m and one from South Africa at depths between 18 and 80 m.

KEY TO THE SPECIES OF *DICOIDES*

1 Telson longer than peduncle of uropod 2
– Telson no more than two-thirds length of peduncle of uropod 3
2 Carpus, propodus and dactyl of pereiopod 1 all areolate, massive, dactyl longest; pseudorostrum horizontal and siphon much shorter than carapace *D. areolatus* Hale, 1946—Australia
– Pereiopod 1 not areolate or massive; carpus and propodus subequal in length and each longer than dactyl; pseudorostrum slightly upturned and siphon more than half length of carapace .. .. *D. brevidactylus* (Hale, 1937*a*)—Australia

3 Telson more than half as long as peduncle of uropod; siphon at least half length of carapace (may be broken); sides of carapace with three to four shallow longitudinal grooves .. .. *D. siphonatus* sp. nov.
– Telson less than half as long as peduncle of uropod; siphon much less than half length of carapace; sides of carapace with one shallow longitudinal depression or none .. 4
4 Pereiopod 1 twice length of carapace in male and even longer in female, with carpus and propodus highly setose; exopod of uropod shorter than endopod; carapace without shallow lateral depression .. .. *D. fletti* Hale, 1946—Australia
– Pereiopod 1 of male about one and a half times length of carapace (female unknown), with carpus and propodus not setose; rami of uropod subequal in length; carapace with a shallow midlateral depression .. .. *D. occidentalis* Hale, 1951—Australia

Dicoides siphonatus sp. nov.

Fig. 2

Records

			adult ♂	♂	ovig. ♀	juv. & manca	total	no. of records
FAL	34°S 18°E	18– 54 m	1		3	1	5	2
SST	34°S 21°E	80 m	7		9		16	1
NIWR	30°S 30°E–33°S 25°E	20–102 m	2	3	3	6	14	7

Holotype

Ovigerous female, in the South African Museum, SAM–A15723, collected by the University of Cape Town, 21 June 1972. Type locality: 80 m, off Still Bay (34°40′S 21°39′E). UCT station number SST 26H.

Etymology

Sipho, siphonis (L)—a siphon, referring to the elongate exhalant siphon.

Description

Ovigerous female, holotype, length 3,4 mm. Integument calcified, translucent, and with fine, elongate reticulations, appearing crystalline in intermoult individuals. Carapace (Fig. 2A) slightly longer than deep with three shallow longitudinal grooves on either side. Pseudorostrum slightly produced, moulded around extremely long, upturned siphon almost as long as carapace (this may be damaged, as in the holotype, and is sometimes entirely missing). Antennal notch a slight excavation. Carapace in dorsal view (Fig. 2B) with very indistinct middorsal carina. Eyelobe small, eyeless, wider than long.

Second pedigerous somite wide and separating last three pairs of legs from first two. Fifth pedigerous somite dorsally situated. Abdominal somites cylindrical, together no longer than cephalothorax. Marsupium large and well developed.

Antenna 1 (Fig. 2C) short, first and third segments subequal in length, second shorter. Both flagella very short, 2-segmented; main flagellum with one short aesthetasc.

Basis of maxilliped 3 (Fig. 2D) expanded distally, nearly half as wide as long. Ischium and merus subequal in length, as are carpus and propodus. Dactyl long and slender.

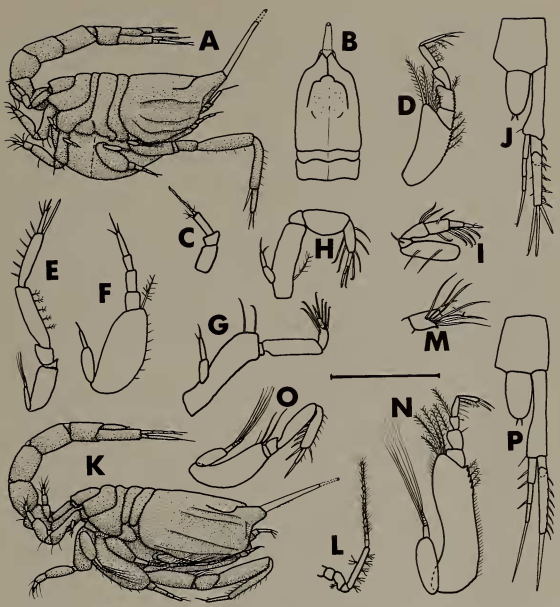

Fig. 2. *Dicoides siphonatus* sp. nov.

Ovigerous female. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Pereiopod 3. H. Pereiopod 4. I. Pereiopod 5. J. Uropod and telson.

Adult male. K. Lateral view. L. Antenna 2. M. Detail of flagellum of antenna 2. N. Maxilliped 3. O. Pereiopod 1. P. Uropod and telson.

Scale line = 1 mm for A–B, K; 0,1 mm for M; 0,5 mm for C–J, L, N–P.

Basis of pereiopod 1 (Fig. 2E) less than a quarter total length of limb; exopod small with few setae. Ischium much wider than long; carpus longer than three preceding segments together, slightly flattened; propodus slightly shorter than carpus; dactyl long and slender. Pereiopod 2 (Fig. 2F) 6-segmented. Basis large and wide, longer than rest of limb. Next three segments subequal in length, dactyl slightly longer. Exopod with a single terminal seta. Pereiopod 3 (Fig. 2G) stout, basis longer than rest of limb. Ischium extremely small. Merus long and parallel-sided, last two segments small. Pereiopod 4 (Fig. 2H) similar to pereiopod 3 but basis shorter than rest of limb, ischium larger, merus much wider and carpus slightly longer. Exopod short and 2-segmented. Pereiopod 5 short, reflexed dorsally. Merus and carpus (Fig. 2I) stout, subequal in length.

Telsonic somite (Fig. 2J) slightly longer than wide, subequal in length to telson. Telson elongate-oval, about twice as long as wide with two small terminal spines. Peduncle of uropod about a third as long again as telson, wider distally and unarmed. Exopod subequal in length to peduncle with several small spines on outer edge and three long ones terminally. Endopod about three-quarters length of exopod, segments subequal in length.

Adult male, *paratype*, length 3,3 mm. As female, except as follows: siphon longer, less upturned, with a few minute denticles below (Fig. 2K). Pseudorostrum shorter and carapace longer with four shallow longitudinal grooves. Pereion shorter, abdomen slightly stouter.

Antenna 2 (Fig. 2L) reaching to end of carapace with thirteen fairly short segments (Fig. 2M). Basis of maxilliped 3 (Fig. 2N) enormous in comparison with that of female. Basis of pereiopod 1 (Fig. 2O) longer than next three segments together, carpus shorter. Basis of pereiopod 2 rectangular, merus shorter. Basis of pereiopod 3 very wide, merus more slender. Exopods of maxilliped 3 and pereiopods 1–3 very well developed. Basis and merus of pereiopod 4 less stout, exopod much smaller.

Telson (Fig. 2P) slightly longer, peduncle of uropod distinctly so. Endopod more nearly equal in length to exopod.

A single *adult male* from Natal has the second antenna developed to the same extent as that described above but the exopod of pereiopod 4 is as large as that of pereiopod 3.

Three *mancas*, also from Natal, have the first pereiopods relatively very much larger than in the adults, although the proportions of the limbs are the same as those of the adult female described above. In all other respects these mancas agree with the adults.

In *newly moulted individuals* the exhalant siphon is usually much better preserved, but the longitudinal grooves on the carapace are difficult to detect.

Length

Adult male	3,1–3,3 mm
Ovigerous female	2,5–3,4 mm

Remarks

This species clearly belongs to *Diocoides*, which was previously known only from Australia. It is closest to *D. brevidactylus* (Hale, 1937*a*), in which the dactyl of the first pereiopod is very short and the siphon long. The two are easily distinguished, however, by the longitudinal grooves on the carapace, the shorter telson and pseudorostrum and the much shorter stouter second pereiopod in *D. siphonatus*.

Distribution

From False Bay to Durban at depths from 18 to 102 m.

Gynodiastylis Calman, 1911

Generic diagnosis

Antenna 1 small or moderate in size. Exopods present on pereiopods 1 and 2 in both sexes; always absent from pereiopods 3 and 4 of female, but usually present in male. Propodus of pereiopod 1 short, often with a brush of long, stiff setae. Telson seldom longer than telsonic somite, post-anal part no more than a third of total length; not more than two pairs of articulated lateral spines on telson although lateral edges may be incised; terminal spines none or two. Endopod of uropod 1-, 2- or 3-segmented.

Type species

Gynodiastylis carinatus Calman, 1911, from New Zealand.

Remarks

Calman erected the genus for 4 species, 2 from New Zealand and 2 from Malaya. 42 species are now known, 30 from Australia, 7 from Malaya and Japan and 5 new ones from South Africa. Although morphological details vary, the genus, which is the largest in the family, is quite a distinctive one. In more than half the species, the propodus of the first pereiopod bears a very characteristic brush of long, stiff setae on the expanded distal edge, while in the rest this segment is not expanded distally and bears a few short setae. There appear to be no other accompanying features which would satisfactorily separate the species into two genera, particularly as the telson is very variable (Hale 1946), but not uniformly so in the species possessing or lacking long setae on the first pereiopod.

Distribution of Gynodiastylis

Until the discovery of the five local species described here, it seemed that the genus was confined to a narrow band of the Indo-West-Pacific from Japan through south-eastern Asia to Australia and New Zealand. All the species from that area are shallow-water inhabitants occurring at depths from 0 to 120 m. Four of the South African species fall within that depth range, but one, *G. profundus*, is known from 80 to 680 m, an enormous increase in the known depth range for the genus and for the family.

KEY TO THE SPECIES OF *GYNODIASTYLIS* DESCRIBED SINCE 1946

1 Carapace quite smooth with no longitudinal ridges, carinae or depressions, even on pseudorostral lobes 2
– Carapace with one or more pairs of ridges, carinae or depressions on pseudorostrum or elsewhere 6
2 Endopod of uropod 3-segmented in female (male unknown) *G. platycarpus* Gamo, 1961—Japan
– Endopod of uropod 1-segmented in both sexes (where known) 3
3 Telson half length of peduncle of uropod or less .. .. .. *G. curvirostris* sp. nov.
– Telson more than two-thirds length of peduncle of uropod 4
4 Basis of pereiopod 2 longer than rest of limb; propodus of pereiopod 1 with 5–6 setae much shorter than basis .. .. *G. fulgidus* sp. nov.
– Basis of pereiopod 2 shorter than rest of limb; propodus of pereiopod 1 with seven or more setae longer than basis 5
5 Three spines on inner edge of endopod of uropod *G. rotundicaudatus* Gamo, 1961—Japan
– Five spines on inner edge of endopod of uropod *G. nitidus* Harada, 1962—Japan
6 Irregularities of carapace confined to a single pair of carinae submedially on pseudorostrum; endopod of uropod 1-segmented in both sexes .. *G. profundus* sp. nov.
– Carapace with carinae, ridges or depressions other than those on pseudorostrum; endopod of uropod 2-segmented in male (where known) and 1- or usually 2-segmented in female 7
7 Carapace with at least five pairs of well-defined longitudinal ridges or carinae, some of which may be short 8
– Carapace with no more than three pairs of often ill-defined longitudinal ridges or carinae 11
8 Carapace deeply concave middorsally between a pair of sharp, raised dorsolateral carinae .. .. *G. sulcatus* sp. nov.
– Carapace convex middorsally, with or without a pair of sharp dorsolateral carinae 9
9 Endopod of uropod 1-segmented in female, 2-segmented in male; anterolateral part of carapace not depressed but with several ridges in male, slightly depressed but with a single, short dorsoventral ridge in female .. .. .. *G. lineatus* sp. nov.
– Endopod of uropod 2-segmented in both sexes; anterolateral part of carapace with a depressed area, quite devoid of ridges, running back from antennal notch for more than half length of carapace 10
10 Carpus of pereiopod 1 longer than basis; telson as wide as long; peduncle of uropod very stout .. .. *G. anguicephalus* Harada, 1962—Japan
– Carpus of pereiopod 1 shorter than basis; telson one and a half times as long as wide; peduncle of uropod slender .. .. .. *G. tubicolus* Harada, 1962—Japan
11 Telson about one and a half times as long as wide, subequal in length to telsonic somite 12
– Telson hardly longer than wide, shorter than telsonic somite 13
12 Telson less than half length of peduncle of uropod; basis of pereiopod 1 as long as next four segments together; basis of pereiopod 2 of adult male nearly as wide as long *G. ineptus* Hale, 1951—Australia
– Telson more than half length of peduncle of uropod; basis of pereiopod 1 as long as next three segments together; basis of pereiopod 2 of adult male more than twice as long as wide .. .. *G. vicarius* Hale, 1951—Australia
13 Propodus of pereiopod 1 with a brush of long, stiff setae; first segment of endopod of uropod twice as long as second .. .. .. *G. milleri* Jones, 1963—New Zealand
– Propodus of pereiopod 1 with one short seta; segments of endopod of uropod subequal in length .. .. *G. mundus* Hale, 1951—Australia

In 1946, Hale produced a useful key to the thirty-one species known in the genus at the time. His key has not been superseded in any way, but the fourteen species described since 1946 are included in the key below. Consultation

of this and Hale's key should allow identification of all known species. Possible synonyms are not indicated here.

Gynodiastylis sulcatus sp. nov.

Figs 3–4

Records

NIWR 30°S 30°E 60–86 m 1 adult ♂, 1 ♂, 2 ovig. ♀♀, 4 ♀♀, 1 juv. (4 records)

Holotype

Ovigerous female, in the South African Museum, SAM–A15724, collected by the NIWR, 24 May 1973. Type locality: 74 m, off Hibberdene, near Durban (30°37′S 30°40′E). NIWR station number 'Coast 6/P3'.

Etymology

Sulcus (L)—a groove, referring to the grooved carapace.

Description

Ovigerous female, holotype, length 2,7 mm. Integument translucent with small, slightly crystalline reticulations. Carapace (Fig. 3A) not much longer than deep, concave middorsally between a pair of sharp dorsolateral carinae. Sides of carapace slightly convex with three short longitudinal ridges on posterior third; below these a long, sharp ventrolateral carina extending almost entire length of carapace. Antennal notch distinct, minutely serrated behind rectangular anterolateral angle. Carapace in dorsal view (Fig. 3B) about one

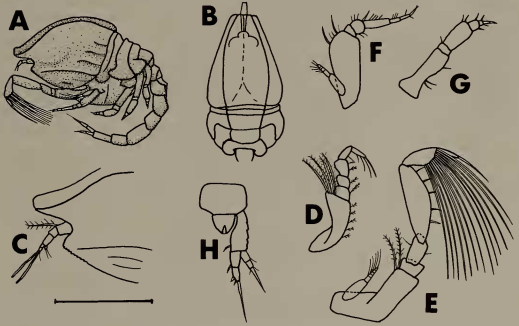

Fig. 3. *Gynodiastylis sulcatus* sp. nov.
Ovigerous female. A. Lateral view. B. Dorsal view of carapace. C. Detail of anterior tip of carapace. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Pereiopod 4. H. Uropod and telson.
Scale line = 1 mm for A–B; 0,5 mm for C–H.

and a third times as long as wide. Eyelobe small, eyeless. Pseudorostral lobes with a pair of short, sharp carinae running from anterior edge to eyelobe.

First two pedigerous somites narrow, third very wide. Cephalothorax slightly longer than abdomen. First three abdominal somites slightly excavate dorsally, the rest cylindrical. Marsupium bearing one very large egg.

Antenna 1 (Fig. 3C) fairly small, basal segment largest. Flagellum 2-segmented, accessory flagellum minute and 1-segmented.

Basis of maxilliped 3 (Fig. 3D) widened distally, shorter than remaining segments together.

Basis of pereiopod 1 (Fig. 3E) angled, about half as long as remaining segments together. Ischium wider than long; carpus very large, subequal in length to basis and slightly flattened; propodus less than half length of carpus with 13 long, stout curved setae on widened distal edge; dactyl small. Exopod small with short flagellum. Basis of pereiopod 2 (Fig. 3F) large and stout, subequal in length to rest of limb. Exopod small. Pereiopods 3, 4 (Fig. 3G) and 5 similar; basis stout, subequal in length to rest of limb; merus very large; last three segments very short.

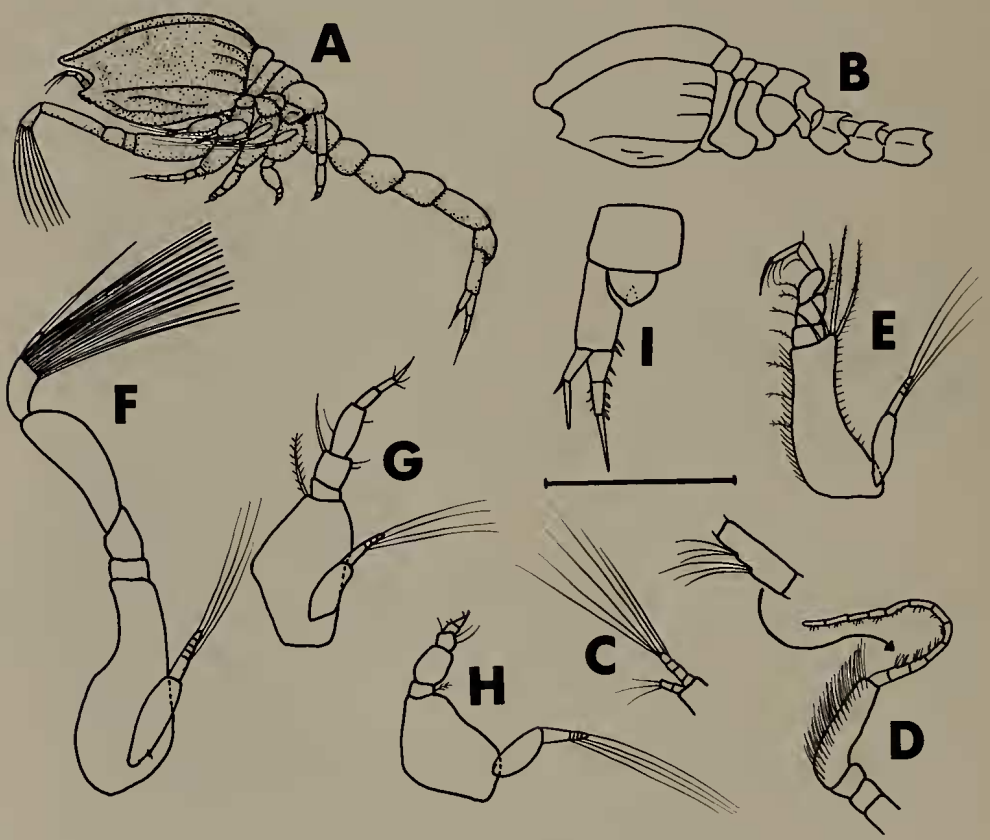

Fig. 4. *Gynodiastylis sulcatus* sp. nov.
Adult male. A. Lateral view. B. Dorsolateral view. C. Detail of tip of antenna 1. D. Antenna 2. E. Maxilliped 3. F. Pereiopod 1. G. Pereiopod 2. H. Pereiopod 4. I. Uropod and telson. Scale line = 1 mm for A–B; 0,5 mm for C–I.

Telsonic somite (Fig. 3H) wider than long, telson semicircular. Peduncle of uropod about twice length of telson, serrated on outer edge. Exopod two-thirds length of endopod, both with two subequal segments and one long terminal spine.

Adult male, paratype, length 2,7 mm, from Natal. As female, except as follows: carapace (Fig. 4A) longer and shallower, anterolateral angle acute. Sides of carapace parallel in dorsal view, pseudorostrum protruding slightly anteriorly (Fig. 4B). First pedigerous somite hardly visible, rest narrower and carinate dorsolaterally.

Second segment of antenna 1 slightly longer, flagellum (Fig. 4C) 4-segmented and accessory flagellum 2-segmented. Antenna 2 (Fig. 4D) with short, 12-segmented flagellum. Basis of maxilliped 3 (Fig. 4E) longer, stouter and less angled. Bases and exopods of pereiopods 2 (Fig. 4G) to 4 (Fig. 4H) much wider, merus of pereiopods 3 and 4 smaller. Basis and carpus of pereiopod 4 slightly smaller than that of pereiopod 3, merus slightly stouter.

Peduncle of uropod (Fig. 4I) not serrated. Exopod shorter and 1-segmented.

Length

Adult male	2,7 mm
Ovigerous female	2,7 mm

Remarks

The only other species in the genus having a distinct middorsal concavity on the carapace is *G. bicristatus* Calman, 1911, from Siam and Japan. *G. sulcatus* has three minor and one major longitudinal ridges on the carapace below the dorsolateral carina whereas the sides of the carapace are quite smooth in *G. bicristatus*. The uropods also differ: in *G. bicristatus* the exopod is 2-segmented in both sexes and the first segment is much shorter than the second. In *G. sulcatus* the exopod is 1-segmented in the male and the segments in the female are subequal in length.

Distribution

Known from Natal between Port Shepstone and Hibberdene at depths from 60 to 86 m.

Gynodiastylis curvirostris sp. nov.

Fig. 5

Records

NIWR 31°S 30°E–30°S 30°E 37–75 m 1 adult ♂, 3 ovig. ♀♀, 2 ♀♀, 1 juv. (4 records)

Holotype

Adult male, in the South African Museum, SAM–A15725, collected by the NIWR, 19 July 1972. Type locality: 72 m, south of Durban (31°04′S 30°19′E). NIWR station number 2/36.

Etymology

Curvus (L)—curved; rostrum (L)—a snout, referring to the curved pseudorostrum.

Description

Adult male, holotype, length 2,6 mm. Integument smooth, translucent, with fairly large reticulations (a patch illustrated in Fig. 5H). Carapace (Fig. 5A) more than twice as long as deep; pseudorostrum curved strongly downwards in a smooth arch. Anterolateral angle and antennal notch wanting. As female (Fig. 5I) in dorsal view. Carapace distinctly longer than free pedigerous somites together. Abdominal somites subcylindrical, cephalothorax and abdomen subequal in length.

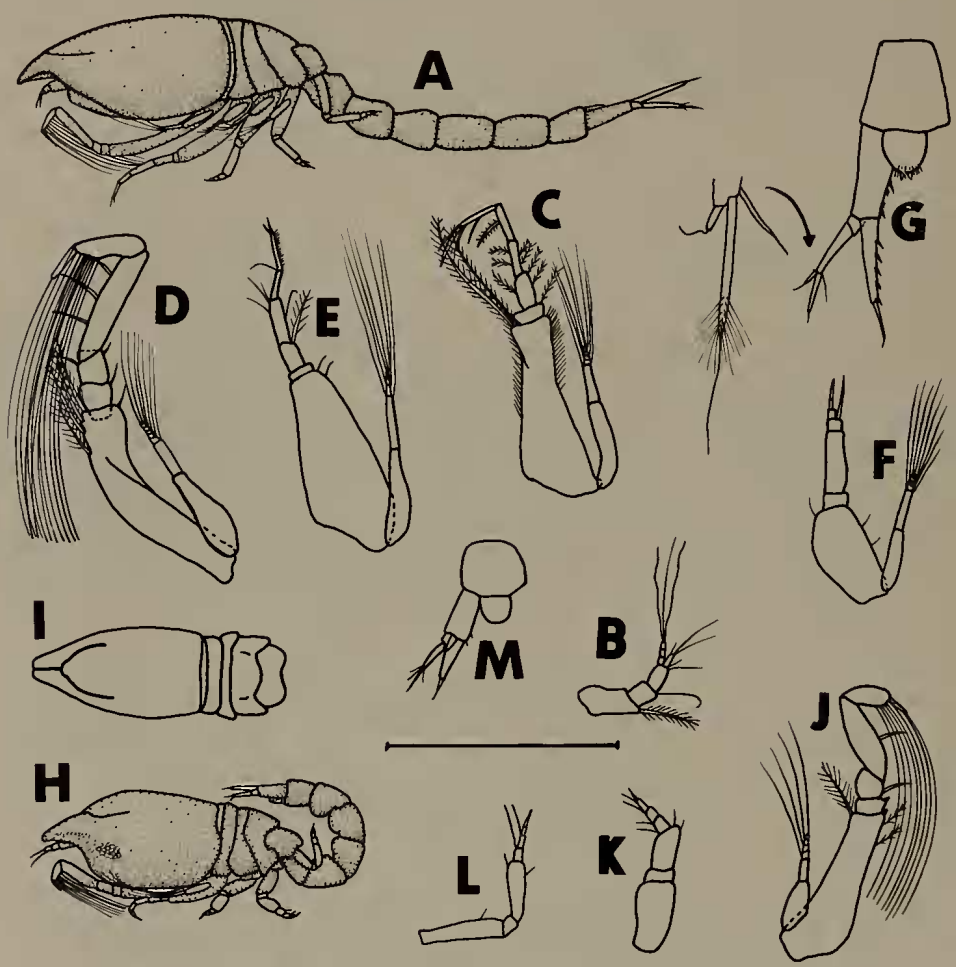

Fig. 5. *Gynodiastylis curvirostris* sp. nov.
Adult male. A. Lateral view. B. Antenna 1. C. Maxilliped 3. D. Pereiopod 1. E. Pereiopod 2. F. Pereiopod 3. G. Uropod and telson.
Ovigerous female. H. Lateral view. I. Dorsal view of carapace. J. Pereiopod 1. K. Pereiopod 3. L. Pereiopod 5. M. Uropod and telson.
Scale line = 1 mm for A–B, H; 0,5 mm for C–G, I–M.

Antenna 1 (Fig. 5B) small, first segment shorter than next two together; flagellum 3-segmented and accessory flagellum 1-segmented. Segments of antenna 2 rather long, each with two sets of long setae.

Basis of maxilliped 3 (Fig. 5C) wider proximally than distally, longer than rest of limb. Ischium short and wide, remaining segments slender.

Basis of pereiopod 1 (Fig. 5D) longer than next three segments together; exopod large. Ischium and merus subequal in length; carpus elongate, more than one and a half times length of ischium and merus together with three fine spines on lower edge; propodus half length of carpus with twelve very long serrate setae. Pereiopod 2 (Fig. 5E) relatively large, basis stout. Ischium very short, merus and carpus each longer than preceding segment. Propodus and dactyl subequal in length, dactyl with a row of very small spines on lower edge. Pereiopods 3 (Fig. 5F) and 4 similar, exopods present. Basis wide and stout, ischium short; merus almost as long as basis; last three segments small. Pereiopod 5, especially basis, much narrower than pereiopod 3.

Telsonic somite (Fig. 5G) longer than wide. Telson semicircular with a few fine hairs and one pair of small spines terminally. Peduncle of uropod twice length of telson, stout, with two small spines and several fine hairs on inner edge. Endopod 1-segmented. Complex spines at tip of exopod illustrated.

Ovigerous female, length 1,8 mm (NIWR station number 'coast 4/Q3'). As male, except as follows: carapace (Fig. 5H) shorter and deeper; pseudorostrum less curved. Eyelobe (Fig. 5I) very shallow; carapace in dorsal view tapering smoothly anteriorly.

Flagellum of first antenna 2-segmented. Maxilliped 3 lacking exopod, basis longer than rest, carpus and propodus wider. Basis of pereiopod 1 (Fig. 5J) slightly longer, carpus slightly shorter. Pereiopods 3 (Fig. 5K) to 5 (Fig. 5L) similar, basis narrower and carpus shorter and stouter; last three segments subequal in length. Pereiopod 5 narrower.

Telsonic somite Fig. 5M about as wide as long, telson small and semicircular. Endopod stouter with a single terminal spine. First segment of exopod a lot stouter than second.

Length

Adult male	2,6 mm
Ovigerous female	1,8–2,4 mm

Remarks

G. curvirostris falls in the group of species in which the carapace is very smooth and evenly rounded and the propodus of pereiopod 1 is setose. Most of these species have the endopod of the uropod 2- or 3-segmented, but *G. curvirostris* may be distinguished from those in which this ramus is 1-segmented as follows: in *G. rotundicaudatus* Gamo, 1961, and in *G. nitidus* Harada, 1962, the telson is longer than the peduncle of the uropod; in *G. similis* Zimmer, 1914, the endopod of the uropod is 2-segmented in the female and the uropod is very short in both sexes; in *G. fulgidus* sp. nov. the basis of pereio-

pod 1 is longer than the rest of the limb, while the setae on the propodus are much shorter and more sparse, and the pseudorostrum is hardly bent downwards.

Distribution

Off Durban from 37 to 75 m.

Gynodiastylis profundus sp. nov.

Fig. 6

Records

			adult ♂	♂	ovig. ♀	♀	juv.	total	no. of records
SST	35°S 22°E	200 m			1	1		2	1
SM	27–28°S 32°E	550–680 m	5	1	3	5	1	15	2
NIWR	29°S 31°E–30°S 30°E	80– 94 m		1		1		2	1

Holotype

Ovigerous female, in the South African Museum, SAM–A15726, collected by the South African Museum, 22 May 1976. Type locality: 550 m, in the southern Mozambique Channel (27°59′S 32°40′E). SAM station number SM 86.

Etymology

Profundus (L)—deep, referring to the depth at which this species occurs.

Description

Ovigerous female, holotype, length 4,6 mm. Integument translucent, finely and lightly striated. Carapace (Fig. 6A) twice as long as and slightly wider than deep, smoothly arched dorsally. Anterolateral angle rounded, obtuse. Antennal notch very shallow. Pseudorostrum (Fig. 6B) fairly long with a single pair of transparent, keeled submedian carinae running from anterior tip to eyelobe.

First pedigerous somite very narrow, next four subequal in length. Abdominal somites subcylindrical, abdomen subequal in length to carapace.

Antenna 1 (Fig. 6C) small, first segment subequal in length to next two together. Both flagella small and 1-segmented.

Maxilliped 3 (Fig. 6D) rather long, basis almost rectangular, shorter than remaining segments together. Ischium and merus short, carpus and propodus somewhat elongate, subequal in length.

Bases of pereiopod 1 (Fig. 6E) subequal in length to carpus. Transparent, flanged lower edge of carpus with seven fine setae. Propodus stout with twelve long, fine serrate setae reaching back beyond distal tip of basis. Pereiopod 2 (Fig. 6F) fairly small, basis longer than rest of limb. Last three segments subequal in length. Pereiopods 3 (Fig. 6G) and 4 similar, merus subequal in length to last three segments together. Pereiopod 5 (Fig. 6H) reflexed dorsally. Basis longest, last three segments subequal in length.

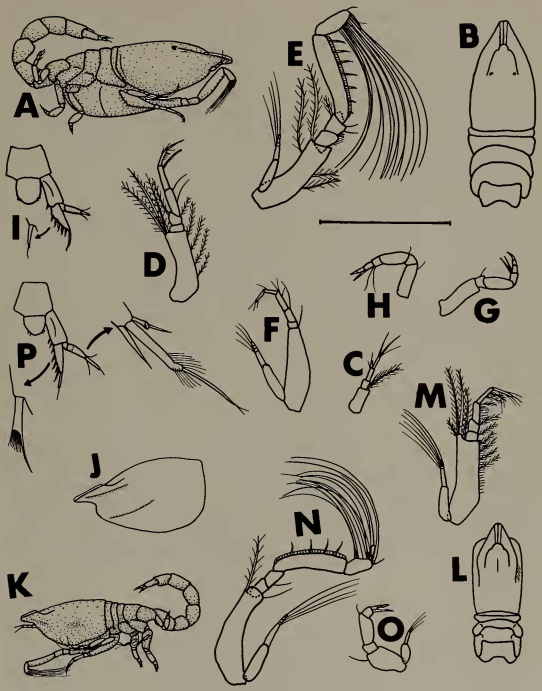

Fig. 6. *Gynodiastylis profundus* sp. nov.
Ovigerous female. A. Lateral view. B. Dorsal view of cephalothorax. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Pereiopod 3. H. Pereiopod 5. I. Uropod and telson. J. Lateral view of carapace of specimen from Natal.
Adult male. K. Lateral view. L. Dorsal view of carapace. M. Maxilliped 3. N. Pereiopod 1. O. Pereiopod 3. P. Uropod and telson.
Scale line = 2 mm for A–B, J–L; 1 mm for C–I, M–P.

Telsonic somite (Fig. 6I) wider than long. Telson short, as wide as long, with two pairs of very small teeth laterally. Uropods very short, peduncle hardly longer than telson. Endopod slightly longer than exopod, 1-segmented and much wider proximally than distally with several short compound setae on inner edge.

Note: a single ovigerous female (Fig. 6J) from NIWR station 6/03 bears two extra pairs of short, sharp carinae below the eyelobe, but in all other respects seems to be similar to the holotype.

Adult male, paratype, length 3,7 mm. As female, except as follows: carapace (Fig. 6K) shorter, slightly compressed midlaterally and below pseudorostrum. Sides parallel in dorsal view. (Fig. 6L.)

Third segment of antenna 2 strongly setose, segments of flagellum about twice as long as wide. Basis of maxilliped 3 (Fig. 6M) larger, distal segments relatively shorter. Basis of pereiopod 1 (Fig. 6N) longer and carpus shorter. Bases of pereiopods 2 to 4 larger and stouter. Carpus of pereiopods 3 (Fig. 6O) and 4 longer and much wider than last two segments together.

Telsonic somite (Fig. 6P) longer, telson relatively shorter with posterolateral teeth more evident. Peduncle of uropods longer relative to telson. Setae of rami complex.

Length

Adult male	3,5–4,2 mm
Ovigerous female	3,7–4,6 mm

Remarks

G. profundus is closest to *G. carinirostris* Hale, 1946, and to *G. milleri* Jones, 1963, all having a smooth carapace and a pair of submedian carinae on the pseudorostrum. However, the endopod of the uropod is 3-segmented in both of the latter, while that of *G. profundus* is 1-segmented in both sexes.

The variation in sculpturing of the carapace in the ovigerous female mentioned above may be a simple genetic character or may be related to the shallower depth at which the specimen was found.

Distribution

From Still Bay to the southern Mozambique Channel, at depths from 80 to 680 m. This is by far the deepest record for any species in the family, the previous deepest records being about 120 m for two other species of *Gynodiastylis* from New South Wales.

Gynodiastylis lineatus sp. nov.

Fig. 7

Records

			adult ♂	♂	ovig. ♀	♀	juv.	total	no. of records
SCD	33°S 27°E	84 m			1			1	1
NIWR	29°S 31°E–30°S 30°E	50–103 m	4	2	4	1	3	14	8

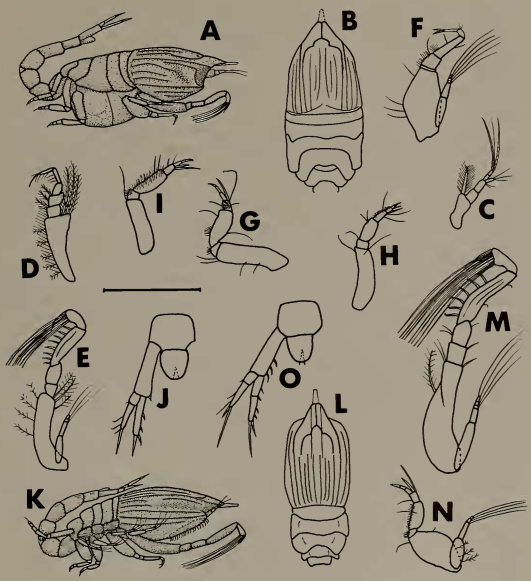

Fig. 7. *Gynodiastylis lineatus* sp. nov.
Ovigerous female. A. Lateral view. B. Dorsal view of cephalothorax. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Pereiopod 3. H. Pereiopod 4. I. Pereiopod 5. J. Uropod and telson.
Adult male. K. Lateral view. L. Dorsal view of cephalothorax. M. Pereiopod 1. N. Pereiopod 2. O. Uropod and Telson.
Scale line = 1 mm for A–B, K–L; 0,5 mm for C–J, M–O.

Holotype

Ovigerous female, in the South African Museum, SAM–A15727, collected by the NIWR, 12 December 1972. Type locality: 54 m, off Tongaat, north of Durban (29°34′S 31°17′E). NIWR station number 3/A2.

Etymology

Linea (L)—a line, referring to the corrugated carapace.

Description

Ovigerous female, holotype, length 3,1 mm. Integument slightly translucent and crystalline. Carapace (Fig. 7A) twice as long as deep with numerous sharp, shallow longitudinal ridges, fading at extreme posterior edge. On each side two major ridges run entire length of carapace, one dorsolaterally immediately below eyelobe and one ventrolaterally at level of anterolateral angle; between these is a slight midlateral depression crossed anteriorly by a single dorsoventral ridge and posteriorly by three longitudinal ones. Below major ridge are two shorter longitudinal ones, and above the upper one are four, none extending on to eyelobe. Antennal notch very slightly excavated anteriorly, carapace behind this smooth for a short distance. Anterolateral angle inconspicuous, obtuse. Eyelobe (Fig. 7B) wider than long, eyeless. Pseudorostrum and siphon short.

Third pedigerous somite very wide. Abdominal somites subcylindrical. Carapace slightly longer than pereion and cephalothorax slightly longer than abdomen. Marsupium large and transparent with eight eggs.

First segment of antenna 1 (Fig. 7C) subequal in length to next two together; flagellum 2-segmented and accessory flagellum 1-segmented.

Basis of maxilliped 3 (Fig. 7D) much narrower proximally than distally, highly setose.

Basis of pereiopod 1 (Fig. 7E) subequal in length to next three segments together. Carpus long and flattened and twice length of propodus with eight stout setae on lower edge. Propodus with seven long, stout serrate setae on expanded distal border. Exopod small. Pereiopod 2 (Fig. 7F) small, basis subequal in length to rest of limb. Ischium very short. Merus stout, propodus and dactyl short and very flexible. Ischium, merus and/or carpus of pereiopods 2 to 5 with brushes of very fine setae. Pereiopods 3 (Fig. 7G) and 4 (Fig. 7H) similar; merus of pereiopod 3 larger, propodus and dactyl of both small and of pereiopod 3 more slender. Ischium and merus of pereiopod 5 (Fig. 7I) with fine setae on lower edge; otherwise as pereiopod 4.

Telsonic somite (Fig. 7J) slightly wider than long, telson oval. Peduncle of uropod nearly twice length of telson and slightly wider distally. Endopod 1-segmented.

Adult male, length 2,6 mm (NIWR station number 2/33). As female, except as follows: carapace (Fig. 7K) slightly more than twice as long as deep, anterolateral angle rounded, antennal notch much deeper. Longitudinal ridges longer midlaterally with no obvious depression behind antennal notch. Eye-

lobe (Fig. 7L) as long as wide; pseudorostrum slightly longer with a pair of submedian ridges. Pedigerous somites narrower and strongly flanged laterally.

Flagellum of antenna 1 slightly longer. Segments of antenna 2 short and rounded with long setae; last basal segment visible through wall of carapace with long setae protruding ventrally. Basis of maxilliped 3 slightly stouter. Pereiopod 1 (Fig. 7M) relatively larger with eight setae on propodus. Ischium of pereiopod 2 hardly distinguishable, merus longer and carpus with fine hairs along entire length; exopod slightly larger. Pereiopods 3 (Fig. 7N) and 4 similar, bases much larger; exopods present.

Telson (Fig. 7O) narrower with a pair of rudimentary spines terminally. Peduncle of uropod less than one and a half times length of telson. Endopod of uropod 2-segmented.

Length

Adult male	2,6–2,9 mm
Ovigerous female	2,4–3,4 mm

Remarks

This species differs slightly from the others which bear a brush of setae on the propodus of the first pereiopod in that it has only six or seven setae in the brush, while most species have eight to twelve. It forms a group with a number of other species which have the carapace bearing numerous longitudinal ridges, but this is the only one in which the female is known to have the endopod of the uropod unsegmented. Most of the species also have a very deep depression midlaterally on the carapace in both sexes, so that the carapace is almost square in cross-section. It is perhaps most similar to *G. costatus* Calman, 1911, in which the female has a row of denticles anteriorly on the carapace, the first antenna is much larger and the endopod of the uropod is 2-segmented in both sexes.

Distribution

East London to Natal north of Durban at depths from 50 to 103 m.

Gynodiastylis fulgidus sp. nov.

Fig. 8

Records

			ovig. ♀	♀	juv.	total	no. of records
SST	34°S 21°E	50–80 m	1	2	1	4	2
FAL	34°S 18°E	29–61 m	8	1		9	9

Holotype

Ovigerous female, in the South African Museum, SAM–A15728, collected by the University of Cape Town, 21 June 1972. Type locality: 80 m on the Still Bay transect (34°40′S 21°39′E). UCT station number SST 26G.

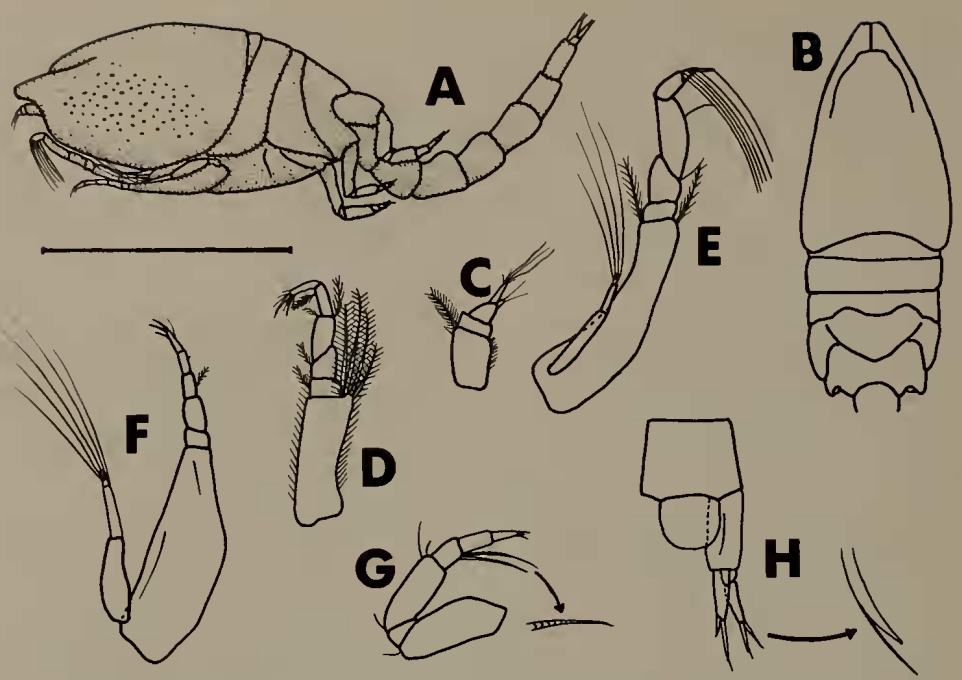

Fig. 8. *Gynodiastylis fulgidus* sp. nov.
Ovigerous female. A. Lateral view. B. Dorsal view of cephalothorax.
Adult female. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2.
G. Pereiopod 3. H. Uropod and telson.
Scale line = 1 mm for A–B; 0,5 mm for C–H.

Etymology

Fulgidus (L)—shining, referring to the smooth carapace.

Description

Ovigerous female, holotype, length 2,6 mm. Integument thin, shiny, and laterally with small, regularly spaced pits on carapace. Carapace (Fig. 8A) large and smooth, as wide as deep and less than one and a half times as wide as long. Anterolateral angle smoothly rounded, antennal notch obsolete. Pseudorostrum short, truncate anteriorly in lateral view. Eyelobe visible laterally above level of pseudorostrum, dorsally (Fig. 8B) very short and wide.

First pedigerous somite visible only dorsally, second to fourth wide. Abdominal somites subcylindrical, abdomen hardly longer than carapace. Marsupium fairly well developed.

Descriptions and figures of appendages taken from *paratype adult female*, length 2,9 mm. Antenna 1 (Fig. 8C) very stout; first segment not much longer than wide and second twice as long. Both flagella 1-segmented.

Basis of maxilliped 3 (Fig. 8D) rectangular, not greatly widened distally and shorter than remaining segments together. Ischium wider than long.

Basis of pereiopod 1 (Fig. 8E) distinctly longer than rest of limb. Exopod fairly small. Carpus unusually short for the genus: one and a half times length of propodus and less than half length of basis. Propodus with five shortish

serrate setae reaching back to level of ischium. Basis of pereiopod 2 (Fig. 8F) very large, nearly twice length of rest of limb. Remaining segments short and poorly armed. Pereiopods 3 (Fig. 8G), 4 and 5 similar. Basis longer than next two segments together; last three segments relatively large.

Telsonic somite (Fig. 8H) not much wider than long. Telson unarmed, slightly wider than long and two-thirds length of peduncle of uropod. Peduncle stout, unarmed. Endopod 1-segmented, both rami with two slender terminal spines.

The *male* is unknown.

Length

Ovigerous female 2,4–3,0 mm.

The brush of setae on the propodus of pereiopod 1 is shorter and more sparse in this species than in any of the others in which it occurs. But since the setae are long, this species must be placed in the group characterized by their possession. Within this group there are three other species which have both a 1-segmented endopod of the uropod and an unsculptured carapace. In *G. rotundicaudatus* Gamo, 1961, and in *G. nitidus* Harada, 1962, however, the telson is longer than the peduncle of the uropod; and in *G. curvirostris* sp. nov. the pseudorostrum is longer and strongly curved, the telson is smaller, the setae on the propodus of pereiopod 1 are much longer and more numerous, the first antenna is more slender and the integument is not pitted.

Distribution

From Still Bay to False Bay at depths from 29 to 80 m.

Haliana gen. nov.

Generic diagnosis

Antenna 1 of moderate size. Exopods entirely absent from thoracic limbs of female. Propodus of pereiopod 1 with a brush of long, stiff setae. Telson short and poorly armed with no post-anal part. Endopod of uropod 2-segmented. Male unknown.

Type species

H. eckloniae sp. nov. (by monotypy).

Etymology

This genus is named for Dr H. M. Hale in appreciation of his extensive work on Australian Cumacea.

Remarks

Although the species for which this genus is erected is very similar to a large number of species of *Gynodiastylis* (and in particular *G. sulcatus* sp. nov.), the lack of exopods on all the thoracic limbs excludes it from this genus. Despite the fact that the existence of this species throws some doubt on the validity of

using the number of exopods on the thoracic limbs in the female as a genuine generic character, *Gynodiastylis* is such a well-known and discrete genus that it would be inappropriate to place this species in it, with a consequent enlargement of the generic diagnosis. For this reason, the new genus is erected, although the author is aware that it does not appear to be a 'good' one. In defence, however, all three female individuals lack thoracic exopods, so that the genus is not erected on the basis of a single abnormal individual.

Distribution of Haliana

The single sample was obtained from a depth of 4 m at Oudekraal on the Cape Peninsula. It was found in the holdfast *Ecklonia maxima*, one of the species of giant kelp growing in abundance around the Cape.

Haliana eckloniae sp. nov.
Fig. 9

Records

CP 34°S 18°E 4 m 2 ovig. ♀♀, 1 ♀, 1 juv. (1 record)

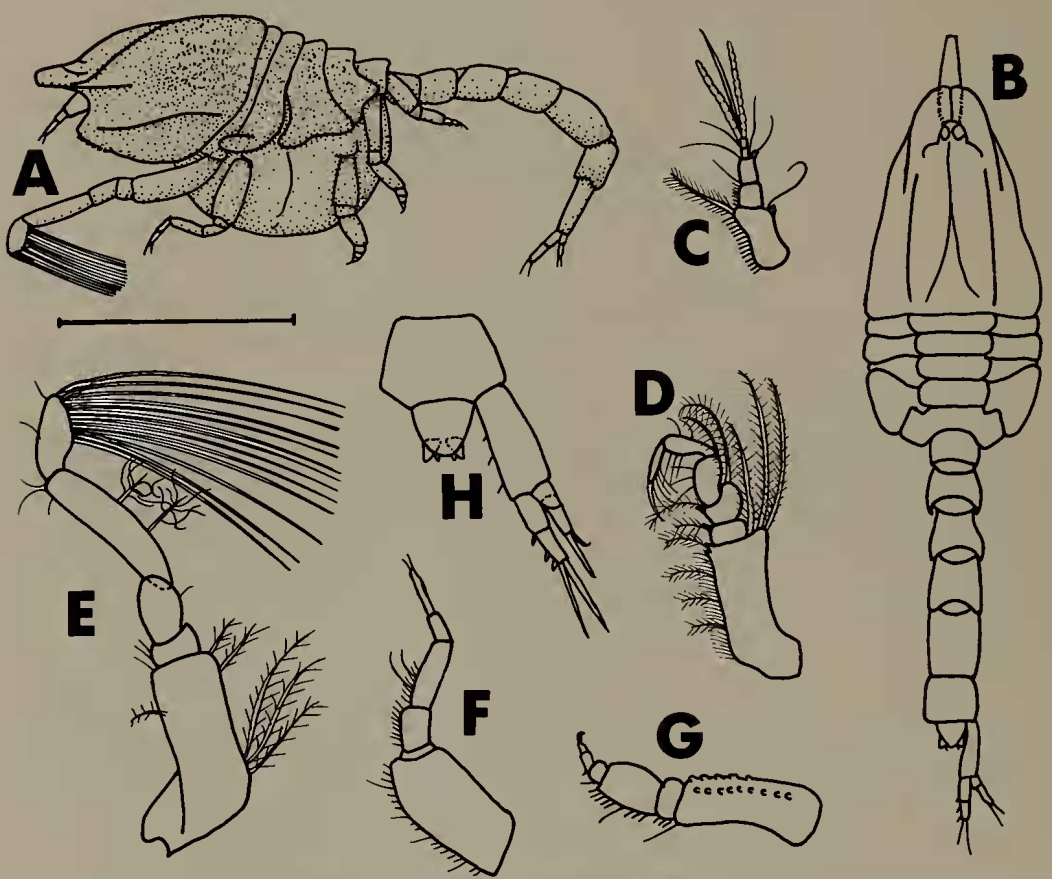

Fig. 9. *Haliana eckloniae* gen. et sp. nov.
Ovigerous female. A. Lateral view. B. Dorsal view. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Pereiopod 4. H. Uropod and telson.
Scale line = 1 mm for A–B; 0,55 mm for C–H.

Holotype

Ovigerous female, in the South African Museum, SAM–A15729, collected by C. L. Griffiths, 6 December 1974. Type locality: in the holdfast of *Ecklonia maxima*, 4 m, from Oudekraal, Cape Peninsula (34°58′S 18°21′E). UCT station number CP 837 A.

Etymology

Ecklonia is the genus of giant kelp on the holdfast of which this species was discovered.

Description

Ovigerous female, holotype, length 2,8 mm. Integument well calcified and slightly shiny with irregular longitudinal rugosities, especially on sides of carapace and pedigerous somites. Carapace (Fig. 9A) little longer than deep with three very distinct lateral carinae. The first runs dorsolaterally from posterior edge for about two-thirds length of carapace; the second runs anterior to and slightly below this from level of frontal lobe round entire anterior margin of flattened pseudorostrum; the third runs ventrolaterally along most of the length of the carapace. A fourth indistinct, minutely denticulate carina runs submedially from eyelobe to anterior tip of carapace. Antennal notch well excavated, anterolateral angle rounded with a few denticles below. Pseudorostrum wider than deep. Eyelobe (Fig. 9B) rounded with two lighter, slightly elevated areas (lenses?) but without pigment. Siphon short.

All five pedigerous somites clearly visible and widely flanged laterally, the third widest and longest. Abdominal somites cylindrical; cephalothorax slightly longer than abdomen. Marsupium well developed.

Antenna 1 (Fig. 9C) short, first segment longer than next two together. Flagellum short and 2-segmented; accessory flagellum minute and 1-segmented.

Basis of maxilliped 3 (Fig. 9D) wide and stout with two small incisions distally on median edge. Ischium wider than long, merus slightly expanded.

Basis of pereiopod 1 (Fig. 9E) shorter than next three segments together. Ischium short and wide; merus about as wide as long; carpus elongate and subcylindrical; propodus about half length of carpus with 13 long, sharp, serrate setae distally on lower edges; dactyl short. Pereiopod 2 (Fig. 9F) small, 7-segmented. Basis subequal in length to next four segments together. Ischium very short; carpus subequal in length to ischium and merus together; dactyl slender and longer than propodus. Pereiopods 3 and 4 (Fig. 9G) similar, with two rows of small protuberances on basis; merus large and stout. Last three segments very short and stout, dactyl with a hooked seta terminally. Pereiopod 5 slightly smaller.

Telson (Fig. 9H) almost semicircular in dorsal view and shorter than telsonic somite, with one pair of very small spines subterminally. Anal valves open in specimen figured. Peduncle of uropod nearly twice length of telson and one and a half times as long as endopod, poorly armed. Exopod two-thirds

length of endopod, segments almost subequal in length. Endopod stouter, 2-segmented, with segments subequal in length.

The *male* is unknown.

Length

Ovigerous female 2,8 mm.

Remarks

See 'Remarks' for the genus.

Distribution

See 'Distribution' for the genus.

DISTRIBUTION OF THE GYNODIASTYLIDAE

The family is confined to shallow waters in the Indo-West-Pacific region, with species extending from the southern and south-eastern coasts of South Africa to Australia, New Zealand, south-east Asia and Japan. This pattern of distribution is unusual for marine organisms, since many of the groups confined to the Indo-West-Pacific are widely distributed within that region. But no shallow-water collecting has been done off the tropical east coast of Africa, virtually none in the Arabian Sea and not very much in India. Thus further collecting in these areas should provide a considerable number of species, and probably other genera, of the family. This hypothesis is supported by the fact that Kurian (1954) referred to *Gynodiastylis* a single damaged specimen from the Palk Strait between India and Ceylon.

That the family is a warm-temperate one is clear from the fact that more than 80 per cent (47 out of 56) of species occur between 40°N and 40°S. Of the remainder, less than 10 per cent (5 species) occur only in Tasmania or New Zealand between 40 and 43°S, and four are found both in Tasmania and New South Wales between 33 and 43°S. None are known from latitudes higher than 43°.

Three genera are endemic to Australia (*Zimmeriana*, *Sheardia* and *Allodiastylis*), one to South Africa (*Haliana*), one is known from both Australia and South Africa (*Dicoides*) and one (*Gynodiastylis*) is widespread throughout the range.

All but one of the species are confined to depths of 120 m or less, and three are known intertidally. This again suggests a very strong dependence on warm water. The single deep-water species, *Gynodiastylis profundus* sp. nov., occurs at depths from 94 to 680 m in Natal and the southern Mozambique Channel. Possibly other species remain to be found in deeper waters where the temperature remains reasonably high on the bottom, as in the Indian Ocean.

DISTRIBUTION OF THE SOUTHERN AFRICAN GYNODIASTYLIDAE

The fact that no species have been found on the cool west coast of southern Africa is a further indication that the family is a warm-water one. Three of the

local species (*Gynodiastylis sulcatus*, *G. lineatus* and *G. curvirostris*) are known only from Natal at depths of less than 104 m, where temperatures do not drop much below 16°C throughout the year. Two species are found in False Bay and eastwards, *G. fulgidus* as far as Still Bay and *Dicoides siphonatus* as far as Durban.

The interesting fact about the distribution of *G. profundus* is its relatively great depth range. It occurs fairly frequently from Still Bay at 200 m to the southern Mozambique Channel at 550 to 680 m, and probably extends well to the north of this region.

Haliana eckloniae is one of the few species in the family to be found in relatively cold waters (about 10–12°C). It is known only from the west coast of the Cape Peninsula, from the holdfasts of kelp, which habitat is known to support only two other species of Cumacea, probably members of the genus *Nannastacus*. *Haliana* is monotypic and would appear to be endemic.

No species in the family is known from the west coast north of the Cape Peninsula, not even in the warm and relatively sheltered waters of Langebaan Lagoon and Saldanha Bay, which sometimes harbour south coast species which apparently cannot exist in the colder open waters outside. Beyond this it is not possible to draw general conclusions from records of depths and distributions along the coast. Although 7 species are now known from these waters, they are represented by only 102 individuals from 44 records. This gives a figure of 2,3 individuals per record and a specimen : species ratio of 14,5. Thus the density of specimens is very low while the species diversity is fairly high and comparable with the figure of 15,7 known for the Lampropidae (Day 1978*b*).

Family **Diastylidae** Bate, 1856

Diagnosis

Flagellum of antenna 2 of male with many short segments and reaching at least to posterior end of thorax. Mandible normally boat-shaped but widened at base in *Diastyloides*. Branchial filament divided into numerous leaflets. Exopods present on maxilliped 3 and pereiopods 1 to 4 in male, present in female on maxilliped 3 (except in *Paradiastylis*) and on pereiopods 1 and 2, rudimentary on or absent from pereiopods 3 and 4. Male usually with two pairs of pleopods, but none in *Atlantistylis*; no outer process to inner ramus. Telson variable, usually large, often with a long post-anal part, or short and poorly armed; bearing one pair of terminal spines or none. Uropods usually long and slender, endopod 1-, 2- or 3-segmented.

Type genus

Diastylis Say, 1818 (see discussion on page 221).

Remarks

This family, with more than 200 species, now includes Stebbing's (1913) families Diastyloididae, Colurostylidae, Oxyurostylidae, Ekdiastylidae, Holostylidae, Dicidae and Diastylidae. A number of genera are based on one par-

ticular character and are quite distinctive. These are *Atlantistylis*, which lacks pleopods in the adult male, *Diastyloides* with the mandible broad at base, *Paradiastylis* which lacks exopods on maxilliped 3 of the female, *Dic* with the ischium of maxilliped 3 remarkably enlarged, *Oxyurostylis* which lacks terminal spines on the telson but is otherwise similar to *Diastylis*, and *Leptostyloides* with a peculiar dorsal outgrowth on the fifth abdominal somite.

The genera *Anchistylis*, *Anchicolurus* and *Colurostylis* are closely allied and are easily distinguished by the short, unarmed telson.

Several of the remaining genera are characteristic, but others are not, and there are many intermediate species whose generic positions are doubtful. The majority of species have a 'diastylid facies', including a lightly calcified integument, often with denticles or spines; short, fairly pointed pseudorostral lobes; a serrate or spinose ventrolateral edge to the carapace; a short pereion; a subcylindrical abdomen. The main generic distinctions are based on characters of the telson, the degree of expansion of the bases of the first four pairs of pereiopods in the adult male and the degree of separation of the second and third pereiopods in the ovigerous female. Clearly these last two characters, while obvious in adult specimens, are not satisfactory since many species are based on immature individuals or those thought incorrectly to be adult.

However, the genera based on these last characters are reasonably distinct. *Diastylopsis* and *Brachydiastylis* are characterized by the wide separation of pereiopods 2 and 3 in the ovigerous female, while *Ekleptostylis* and *Dimorphostylis* have widely expanded bases of the first four pairs of pereiopods in the adult male.

It is the genera *Diastylis*, *Leptostylis* and *Makrokylindrus* which are problematical. Whilst most species of these three genera conform to the 'diastylid facies', there are exceptions, particularly in *Makrokylindrus*. *Leptostylis* has been generally diagnosed as 'like *Diastylis* but with the telson short and the body slender' and *Makrokylindrus* as 'like *Diastylis* but with the telson very large'. When these genera were erected such diagnoses were quite adequate, but since then so many intermediate species have been found that there is now an almost continuous series of species from *Leptostylis* through *Diastylis* to *Makrokylindrus*. Cladistically this series should perhaps be considered as one genus, but such a genus would be so large and variable as to be impracticable. Thus, clear dividing lines are needed to separate the genera. It would be useful to find characters other than those concerning the telson, but in practice this is not always possible.

In *Leptostylis*, particularly in adult males, the third segment of the first antenna is always very large, clubbed, highly setose and quite different from that of the female. The flagellum of the second antenna is short and reaches no further than the end of the thorax. Further, the telson is usually shorter than and never more than a quarter as long again as the telsonic somite. The combination of these characters adequately diagnoses the genus, although absolute determination is possible only in the presence of adult males, which is a common

problem in any sexually dimorphic group.

Distinction between *Diastylis* and *Makrokylindrus* is less simple. *Makrokylindrus* incorporates many of the features found in other genera and it is only in the large, partly or wholely cylindrical, poorly armed telson that it is distinguishable from *Diastylis*. It is characteristically a deep-water genus and it is possible that for some reason a large telson is of great enough advantage that it has been acquired by representatives of different genera as they have descended to the depths; if so, the genus is polyphyletic. The dorsal fusion of the third and fourth pedigerous somites was used by Băcescu (1961*a*) to distinguish his subgenus *Coalescuma* but as there are species in the subgenus *Makrokylindrus* that are very similar in all other respects, it would not help to elevate *Coalescuma* to generic rank. The subgenus *Vemakylindrus* Băcescu, 1961*b*, has characteristically long pseudorostral lobes. Several species of *Diastylis* share this feature and it is proposed to elevate *Vemakylindrus* to generic rank, thus uniting clearly similar species from *Diastylis* and *Makrokylindrus*.

But this does not solve the problem of the identity and differentiation of the remaining species. The telsons of some are typical of *Diastylis*, of others typical of *Makrokylindrus* and of the rest are intermediate in nature. Stebbing (1912, 1913) was aware of this problem, which he solved by creating three new genera. *Ekdiastylis* accommodated those species of *Diastylis* with the endopod of the uropod 2-segmented, *Holostylis* those with the endopod 1-segmented and *Adiastylis* those with a telson similar to that of *Makrokylindrus* but with lateral spines. None of these three genera have found acceptance, for reasons discussed below.

Further, Say's description of the type species of the genus *Diastylis*, *D. arenarius* Say, 1818, is incomplete and could apply to virtually any adult male cumacean with a telson. The type material appears to have been lost, and *D. arenarius* was not described in Stebbing's monograph of 1913. Thus the generic characters of the telsonic region of *Diastylis* have never been adequately defined, and in order to do this a new type species must be selected.

Cuma rathkei Kröyer, 1841, was referred by Bate (1856) to *Diastylis* since the genus *Cuma* was preoccupied, and appears to be the first species other than *D. arenarius* to have been assigned to the genus. *D. lucifer* (Kröyer, 1841), *D. tumidus* (Liljeborg, 1855) and *D. bispinosa* Danielssen, 1859 (*non* Stimpson, now *D. cornutus* Boeck, 1864) were added by Danielssen in 1859 and *D. echinatus* by Bate and *D. rugosus* by Sars, both in 1865. All these early species added to the genus are very similar to *D. rathkei* so that a generic diagnosis based on this species is adequate for the genus. Further, *D. rathkei* is probably the best known of all Cumacea. Finality must await the decision of the International Commission on Zoological Nomenclature, to whom the matter has been referred.

Makrokylindrus was erected by Stebbing (1912) for the new species *M. fragilis* as well as for five previously known species, four from *Diastylis* and one from *Diastylopsis*. At the same time he erected the genus *Adiastylis*

for the new *A. acanthodes*, as well as referring to this new genus two species from *Diastylis* and one from *Leptostylis*. The telsonic characters of the early species of *Diastylis* (for example those figured by Sars in 1900) are compared below with those of *Makrokylindrus*, *Adiastylis*, *Ekdiastylis* and *Holostylis* recognized by Stebbing (1912, 1913).

	Diastylis	*Adiastylis*	*Makro-kylindrus*	*Ekdiastylis*	*Holostylis*
structure of telson	slender	moderately stout	very stout	slender to moderate	slender
length of telson	about twice that of telsonic somite	about twice that of telsonic somite	about three times that of telsonic somite	about twice that of telsonic somite	about twice that of telsonic somite
length of telson in relation to peduncle of uropod	approximately equal	longer or shorter	distinctly longer	longer or shorter	shorter or equal
width of post-anal part relative to pre-anal part	less than a third	half to less than a third	more than half	less than a third	about a third
proportion of telson pre-anal	half or less	more than half but less than two-thirds	two-thirds or more	half or more	half or less
number of pairs of lateral spines	3–10+	3–5	0	1–12	6–9
number of segments in endopod of uropod	3	3	3	2	1

It is evident that the only unambiguous character distinguishing *Makrokylindrus* is the absence of lateral spines on the telson, and the only one clearly distinguishing *Diastylis* is the short pre-anal portion of the telson. But examination of the host of species which has been described since 1912 shows an entire range of proportions in the pre- and post-anal parts of the telson; thus this character is no longer diagnostic of *Diastylis*. Many authorities have placed more emphasis on the size and tubular nature of the pre-anal part of the telson in *Makrokylindrus*, so that it is no longer commonly distinguished by the absence of lateral spines; then, too, the distal portion of the telson is often lost or damaged in deep-water forms. Equally, *Ekdiastylis* and *Holostylis* cannot be distinguished from *Diastylis* except by the reduced segmentation of the endopod of the uropod, but some species more recently placed in *Makrokylindrus* also have the endopod of the uropod 2-segmented. Furthermore, many species have been described poorly or from inadequate material, so that without a major investigation of their types, and in the absence of more indi-

viduals, it is not possible to come to firm conclusions about their generic status.

In summary, then, it is only *Holostylis* which is unambiguous in that the endopod of the uropod is unsegmented; it is proposed to reinstate this genus. *Adiastylis* and *Ekdiastylis* should continue to be suppressed, at least for the present.

A large collection of diastylids from the deep Atlantic has recently become available to the author. It is hoped that this material, together with a study of the relevant types, will allow a thorough revision of the *Diastylis*-like genera in the near future. In order to prevent further delay in the publication of the present paper, the genera *Makrokylindrus* and *Diastylis* are here distinguished according to common usage and the South African species placed accordingly.

Adaptive features

In contrast to the gynodiastylids, the diastylids are often large, slender, rather attenuated animals in which the reduction of appendages is minimal. Pleopods and exopods are well developed, indicating that the animals are relatively mobile. The respiratory surfaces are enlarged by numerous gill filaments, allowing enhanced gas exchange and thus a larger body size. The average length of diastylids is about four times that of the gynodiastylids and some may be as long as 35 mm. The majority are filter-feeders (Dennell 1934, Zimmer 1932, Krüger 1940). In these forms the bases of the third maxillipeds and first pereiopods are densely setose and the first pereiopods are slender and often very long, appearing sensory rather than manipulative in function. The uropods and telson are usually both long and well armed, presumably for cleaning the extensive setae on the anterior limbs. Finally, sexual dimorphism is very well developed and the males appear to be far more mobile than the females.

KEY TO THE GENERA OF THE DIASTYLIDAE

Virtually any construction of a key to this family depends initially on characters confined to one sex. In this key other, less rigorous, characters have also been included to assist in the placing of single individuals.

1 No pleopods in adult male; telson very short, as deep as long, with a single pair of terminal spines .. .. *Atlantistylis* Reyss, 1975
– Two pairs of pleopods in adult male; telson variable but seldom as deep as long .. 2
2 Mandibles broad at base; basis of pereiopod 2 usually abruptly wider than ischium with one or two large teeth at lower distal corner .. .. *Diastyloïdes* Sars, 1900
– Mandibles narrow at base; basis of pereiopod 2 narrow distally or abruptly wider than ischium but without one or two strong teeth at lower distal corner 3
3 Maxilliped 3 of female without exopod .. .. .. *Paradiastylis* Calman, 1904
– Maxilliped 3 of female with exopod 4
4 Third (and often fourth and fifth) pedigerous somites produced posteriorly even in male, usually much wider at ventrolateral edge than second so that in ovigerous female pereiopods 3 and 4 are directed posteriorly and widely separated from pereiopod 2; fifth pedigerous somite usually dorsal to fourth 5
– Third and fourth pedigerous somites not produced or directed posteriorly, seldom wider at ventrolateral edge than second; pereiopods 3 to 5 usually directed ventrally and in ovigerous females not widely separated from pereiopod 2; fifth pedigerous somite seldom dorsal to fourth 10

5 Ischium of maxilliped 3 enormously expanded .. .. .. *Dic* Stebbing, 1910
– Ischium of maxilliped 3 not expanded 6
6 Telson with at least one pair of lateral spines (usually several), always more than half length of peduncle of uropod and usually longer than telsonic somite 7
– Telson with no lateral spines; usually less than half length of peduncle of uropod and never longer than telsonic somite 8
7 Female with rudimentary exopods on pereiopods 3 and 4; basis of pereiopod 2 narrow in male; pseudorostrum short and not upturned; telson usually with four or more pairs of lateral spines .. .. *Diastylopsis* S. I. Smith, 1880
– Female without exopods on pereiopods 3 and 4; basis of pereiopod 2 wide in male; pseudorostrum long and upturned; telson with no more than four pairs of lateral spines .. .. *Brachydiastylis* Stebbing, 1912
8 Pleopods uniramous with stout, modified setae; peduncle of uropod less than twice length of telsonic somite .. .. *Anchistylis* Hale, 1945
– Pleopods biramous with normal plumose setae; peduncle of uropod twice length of telsonic somite or more 9
9 Endopod of uropod 3-segmented; basis of maxilliped 3 more than twice and of pereiopod 1 almost twice length of remaining segments together *Anchicolurus* Stebbing, 1912
– Endopod of uropod 2-segmented; basis of maxilliped 3 less than one and a half times length of remaining segments together and of pereiopod 1 shorter than remaining segments together .. .. *Colurostylis* Calman, 1911
10 Telson (excluding terminal spines) shorter than telsonic somite or up to a quarter as long again as telsonic somite but with no more than three or four pairs of lateral spines 11
– Telson (excluding terminal spines) one and a quarter times length of telsonic somite or more; if no longer than telsonic somite then with at least four pairs of terminal spines 14
11 Flagellum of antenna 2 of adult male reaching to end of body; basis of pereiopod 2 (and usually of pereiopods 1, 3 and 4) of male very wide distally; abdomen excluding telson fairly stout and shorter than or subequal in length to cephalothorax; fifth abdominal somite not much longer than fourth or sixth; female usually without exopods on pereiopods 3 and 4 12
– Flagellum of antenna 2 of male not reaching beyond end of pereion; bases of pereiopods 2 to 4 of adult male not especially wide; abdomen excluding telson generally slender and longer than cephalothorax; fifth abdominal somite usually longer than fourth or sixth; female usually with exopods on pereiopods 3 and 4 .. 13
12 Telson of female with about eleven pairs of lateral spines and of male deeply excavated dorsally with five pairs of lateral spines; minute exopods present on pereiopods 3 and 4 of female .. .. *Ekleptostylis* Stebbing, 1912
– No more than four pairs of lateral spines on telson in either sex, telson of male not not excavated dorsally; pereiopods 3 and 4 of female without exopods *Dimorphostylis* Zimmer, 1914*
13 Dorsal surface of 5th abdominal somite smooth; pereiopod 2 not very long with propodus much shorter than basis .. .. *Leptostylis* Sars, 1869
– Fifth abdominal somite with a large posterodorsal protrusion; pereiopod 2 very long, propodus longer than basis .. .. *Leptostyloides* Jones, 1969
14 Endopod of uropod 1-segmented .. .. *Holostylis* Stebbing, 1912
– Endopod of uropod 2- or 3-segmented 15
15 Pseudorostrum much more than half as long as rest of carapace *Vemakylindrus* Băcescu, 1961*b*
– Pseudorostrum much less than half as long as rest of carapace 16
16 Pre-anal part of telson longer than post-anal part with lateral spines usually confined to distal third or less .. .. *Makrokylindrus* Stebbing, 1912†
– Pre-anal part of telson shorter than post-anal part with lateral spines usually present on at least distal half 17
17 Terminal spines present on telson .. .. *Diastylis* Say, 1818
– Terminal spines absent from telson .. .. .. *Oxyurostylis* Calman, 1912

* *Pachystylis* Hansen, 1920, and males of *Paradiastylis* key out here
† *Dimorphostylis australis* keys out here because of its long telson

Dic Stebbing, 1910

Generic diagnosis

Carapace with transverse ridges across frontal lobe. Flagellum of antenna 2 of adult male reaching end of body. Mandible narrow at base. Ischium of maxilliped 3 greatly expanded. Basis of pereiopod 2 large and stout in both sexes. Exopods on pereiopods 3 and 4 of female minute or absent. Male with two pairs of pleopods. Third and fourth pedigerous somites wide and sometimes coalesced. Pereiopods 2 and 3 of ovigerous female somewhat separated. Telson longer than telsonic somite and at least as long as peduncle of uropod; pre-anal part longer than post-anal part. Uropods slender and at least as long as last two abdominal somites together. Endopod of uropod 3-segmented.

Type species

Dic calmani Stebbing, 1910.

Remarks

The genus was erected by Stebbing for a small number of individuals of a single species from South Africa on 'the unique characters of the third maxillipeds and telson', the ischium of maxilliped 3 being very large and flat and the telson of that species very long and tubular with no post-anal part. Stebbing described and figured a young male (which no longer appears to be extant) and it has generally been assumed since then that adult males would prove to lack pleopods. For this reason the genus has always been placed near to *Gynodiastylis*. The finding of large numbers of males with two pairs of pleopods denies an affinity between the two genera and places *Dic* quite definitely in the Diastylidae. Should further confirmation be needed, another two species are now available from South Africa, one of which has a distally armed telson very similar to that of some species of *Makrokylindrus*. Further, the gill plate is divided into numerous filaments, despite Stebbing's statement to the contrary.

Variations in the nature of the telson in the species now known require an alteration of the generic diagnosis to accommodate them, and the third maxilliped becomes the diagnostic feature. For this reason, a fourth species may be added to the genus. This is *Diastylopsis thileniusi* (Zimmer, 1902) from New Zealand. Its telson is not tubular but the third maxilliped is very similar to those of the other three species, and the carapace is sculptured in the same way. The large size of the third and fourth pedigerous somites appears to be an extreme example of the trend which is already noticeable in the other species.

Diastylis fistularis Calman, 1911, from the Gulf of Siam, is very reminiscent of *Dic* in the nature of the telson, the third maxilliped, the carapace and the fusion of the third and fourth pedigerous somites. But it appears from Calman's figures of a very young animal that the basis rather than the ischium of the third maxilliped is widely expanded. Thus, on the available evidence the species cannot be admitted to *Dic* and any further decisions will have to await the collection of more, preferably adult, material.

In his original discussion of the genus, Stebbing suggested that *Diastylis tubulicaudata* should be placed in *Dic*. Examination of new material by Fage (1929) showed quite clearly that the third maxilliped is not modified and that the species belongs in *Makrokylindrus*.

Distribution of Dic

Three species are known from South Africa at depths from 11 to 200 m and one from New Zealand at depths from 0 to 43 m.

KEY TO THE SPECIES OF *DIC*

1 Telson a long, straight tube with virtually no post-anal part and without lateral spines 2
– Telson flattened distally; at least a third of its length post-anal with two or more pairs of strong lateral spines 3
2 Carapace without hairs; anal valves pointing posteriorly; telson terminally without denticles in female and with four short, rounded teeth in male *D. formosae* sp. nov.
– Carapace finely hairy; anal valves pointing ventrally; telson terminally with several minute denticles in both sexes .. .. *D. calmani* Stebbing, 1910—South Africa
3 Pedigerous somites 3 and 4 not coalesced dorsally; telson hardly longer than telsonic somite with 6–8 pairs of lateral spines *D. thileniusi* (Zimmer, 1902)—New Zealand
– Pedigerous somites 3 and 4 coalesced dorsally; telson distinctly longer than telsonic somite with 2–5 pairs of lateral spines .. .. *D. platytelson* sp. nov

Dic calmani Stebbing, 1910

Figs 10–11

Dic calmani Stebbing, 1910: 416, pls 46–47; 1913: 160–161; Jones 1960*a*: 179.

Records

			adult ♂	sub-adult ♂	♂	ovig. ♀	♀	juv.	total	no. of records
SST	34°S 21°E	15–20 m	2	8	1	9	1	1	22	6
SCD	33°S 25°E–34°S 23°E	11–44 m	11	7	3	19	5	3	48	7
NIWR	27°S 32°E–30°S 30°E	43–80 m		1	3	4	6	3	17	7

Previous records

Algoa Bay (33°S 25°E)—44 m (Stebbing 1910: type locality). The single ovigerous female recorded by Jones (1960*a*) from False Bay (34°S 18°E) appears to have been lost. The fact that it was found in False Bay suggests that it may have belonged to *D. formosae* rather than to *D. calmani*.

Syntypes

The young male described and figured by Stebbing (1910) as *D. calmani* from 75 m off East London is no longer extant. All the other individuals in the only sample seen by Stebbing (i.e. the 'paratypes' held by the British Museum (Natural History)) to not belong to this species but to *D. formosae* sp. nov. Since the two species are so similar, it is necessary to select a neotype for *D. cal-*

mani. This is an ovigerous female, in the South African Museum, SAM–A16794, collected by UCT, 5 December 1962. Type locality: 44 m off Port Elizabeth (33°53′S 25°49′E). UCT station number SCD 378K.

The remarks on page 230 discuss the reasons for believing this specimen to belong to Stebbing's species. The locality of the sample from which the neotype was chosen is the closest available in both depth and position to that of Stebbing's material.

Description

Ovigerous female, neotype, length 7,0 mm (SCD 378K). Integument minutely reticulate, somewhat translucent, with fine scattered hairs. Carapace

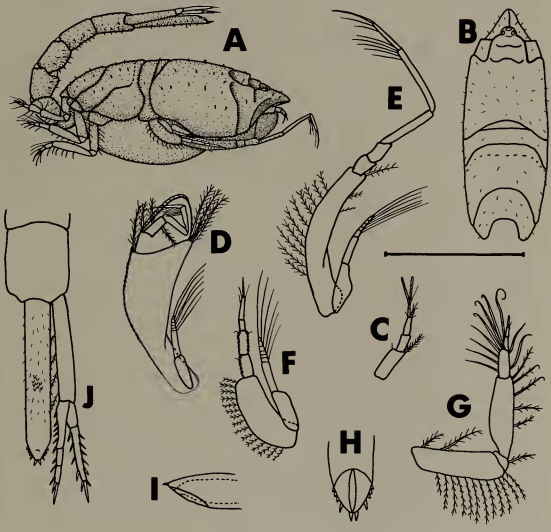

Fig. 10. *Dic calmani*.

Ovigerous female. A. Lateral view. B. Dorsal view of cephalothorax. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiod 2. G. Pereiopod 3. H. Tip of telson in ventral view. I. Tip of telson in lateral view. J. Uropod and telson.
Scale line = 4 mm for A–B; 2 mm for C–G, J; 0,5 mm for H–I.

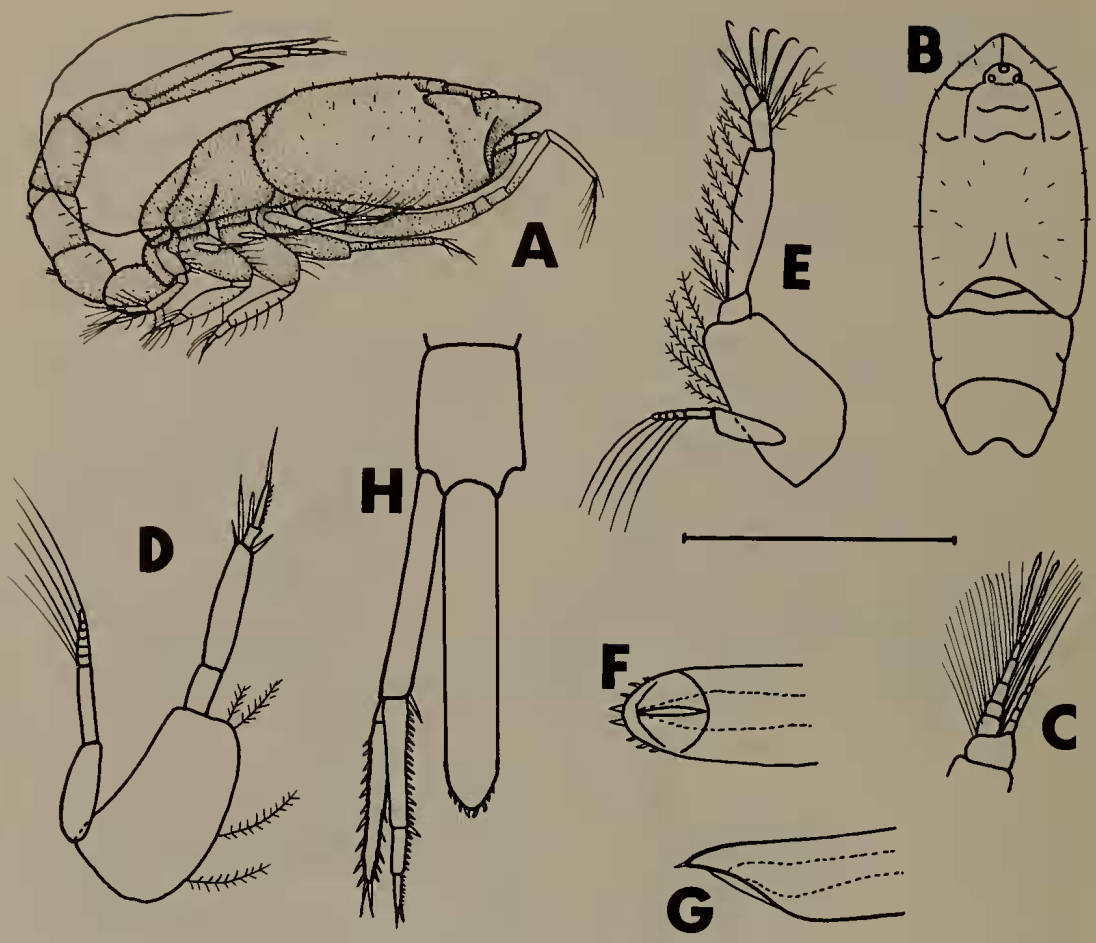

Fig. 11. *Dic calmani.*

Adult male. A. Lateral view. B. Dorsal view of cephalothorax. C. Detail of distal tip of antenna 1. D. Pereiopod 2. E. Pereiopod 3. F. Tip of telson in ventral view. G. Tip of telson in lateral view. H. Uropod and telson.

Scale line = 4 mm for A–B; 2 mm for D–E, H; 1 mm for F–G; 0,5 mm for C.

(Fig. 10A) less than twice as long as deep and slightly wider than deep with two transverse ridges. Posterior ridge runs from ventral edge of carapace about a third from anterior tip to join posterior edge of frontal suture; anterior ridge equidistant between posterior ridge and anterior tip of pseudorostrum, ending midlaterally. Both ridges continuous on eyelobe. (A third short ridge is sometimes present behind and parallel to the first two.) Anterolateral angle not evident, antennal notch smooth, poorly excavated. Pseudorostral lobes fairly short, roundly pointed anteriorly. Carapace slightly produced posterolaterally, obscuring part of first pedigerous somite. Eyelobe (Fig. 10B) short with three small, clear lenses.

Second pedigerous somite narrow, third and fourth wide and fused dorsally; fifth situated dorsal to fourth. Marsupium well developed. Abdominal somites subcylindrical, abdomen subequal in length to cephalothorax.

Antenna 1 (Fig. 10C) fairly small, first segment longest. Flagellum

2-segmented with two aesthetascs; accessory flagellum small and 3-segmented. Antenna 2 of moderate size, 5-segmented.

Maxilliped 3 (Fig. 10D) very wide distally, basis less than three times as long as wide at widest point and slightly serrated on inner edge, proximally much narrower. Exopod of moderate size. Ischium greatly expanded, as wide as long and smoothly rounded distally. Last four segments subequal in length and protected by ischium when folded in on each other.

Pereiopod 1 fairly long, basis slender with some plumose setae on lower border. Ischium and merus short, subequal in length; carpus subequal in length to ischium and merus together and slightly shorter than propodus. Exopods of pereiopods 1 and 2 of moderate size. Pereiopod 2 (Fig. 10F) 6-segmented. Basis stout with numerous short plumose setae on lower edge. Merus, carpus and dactyl subequal in length and propodus slightly shorter. Basis and merus of pereiopod 3 (Fig. 10G) stout and subequal in length; ischium short. Carpus subequal in length to last two segments together and armed with many sharp setae. Armature of distal segments of pereiopods 4 and 5 differs slightly from that of pereiopod 3, limbs otherwise very similar.

Telsonic somite (Fig. 10J) slightly longer than wide; telson covered with very small triangular denticles, twice length of telsonic somite, tubular and tapering at tip with one pair of small terminal spines flanked by several even smaller denticles. Anal valves pointing almost ventrally (Figs 10H, I). Peduncle of uropod fairly slender, about two-thirds length of telson and slightly longer than subequal rami. Endopod 3-segmented, first segment about subequal in length to next two together.

Adult male, length 6,9 mm (SCD 378K). As female, except as follows: carapace (Fig. 11A) slightly more than twice as long as deep, produced posterolaterally to obscure first two and part of third pedigerous somites. Posterior transverse ridge(s) often very faint or absent. Pseudorostrum (Fig. 11B) slightly shorter and less pointed.

Third segment of antenna 1 (Fig. 11C) much shorter and stouter; flagellum 5-segmented and surrounded by many fine setae; accessory flagellum 4-segmented. Basis of maxilliped 3 as wide proximally as distally and four times length of ischium; exopod larger. Basis of pereiopod 1 very slightly longer than rest of limb. Basis of pereiopod 2 (Fig. 11D) very large, carpus more than twice length of merus. Bases of pereiopods 3 (Fig. 11E) to 5 stouter, segments distal to basis relatively more slender. Two pairs of pleopods present.

Telson (Fig. 11H) and peduncle of uropod slightly longer, anal valves subterminal. Endopod longer than exopod by one segment and longer than telson by two segments; last two segments together distinctly shorter than the first.

Length

Adult male	5,6–6,9 mm
Ovigerous female	5,0–7,1 mm

Remarks

The syntypes (a young female, two juveniles and a manca) labelled '*Dic calmani*' and examined by the author do not belong to this species but to *D. formosae* sp. nov. But Stebbing's (1910) figures and descriptions clearly belong to the same species as that described above, which is, therefore, called *D. calmani*. There is little resemblance between Stebbing's figure of the carapace and any actual specimen, but it appears that the carapace of his specimen was flattened and damaged, so that in the figure the pseudorostral lobes are divergent and there appear to be three lenses far back behind the eyelobe. The shape is also odd. But the figures of the limbs are indistinguishable from those of the present specimens, with a few exceptions due to the immaturity of Stebbing's individual. The basis of pereiopod 1 is shorter and the segments of maxilliped 3 distal to the ischium are longer than in adult males. The carpus of pereiopod 2, the bases and exopods of pereiopods 3 and 4 and the proportions of the uropods are as in the ovigerous females, rather than adult males.

The juvenile and manca 'syntypes' are in a poor state of preservation but the large young female (length 6,9 mm) is well preserved and clearly belongs to *D. formosae* rather than to *D. calmani*. The integument is reticulate and rugose, the ischium of maxilliped 3 is excavate and the carpus of pereiopod 2 longer than the merus, while the distal tips of pereiopods 3 to 5 and in particular the uropods and telson are identical with those figured below for *D. formosae*.

In Stebbing's defence, it is not at all surprising that he should have considered there to be only one species, since he had only a single male and female of any size to work from, and the two species are very similar. In fact it was only after examining some hundreds of specimens that the author became aware of the presence of two species. They also overlap geographically in just that area from which Stebbing's material was obtained.

In both species there is considerable intraspecific variation in the sculpturing of the carapace, particularly in the males where the transverse ridges may be well defined (as in the female), evanescent or wanting. Thus separation of *D. calmani* and *D. formosae* is not easy. A comparison of the two species follows the description of the latter.

Distribution

From Still Bay to northern Natal at depths from 11 to 62 m.

Dic formosae sp. nov.

Figs 12–13

Records

			adult ♂	sub-adult ♂	♂	ovig. ♀	♀	juv.	total	no. of records
SB	33°S 17°E	26–31 m.	1				1		2	2
FAL/FBY	34°S 18°E	15–100 m	20	56	54	48	107	20	305	50
SST	34°S 22°E–33°S 21°E	30–200 m	13	9	15	17	24	7	85	8
SCD	34°S 21°E–33°S 25°E	44–183 m	7	11	7	12	10	1	48	13

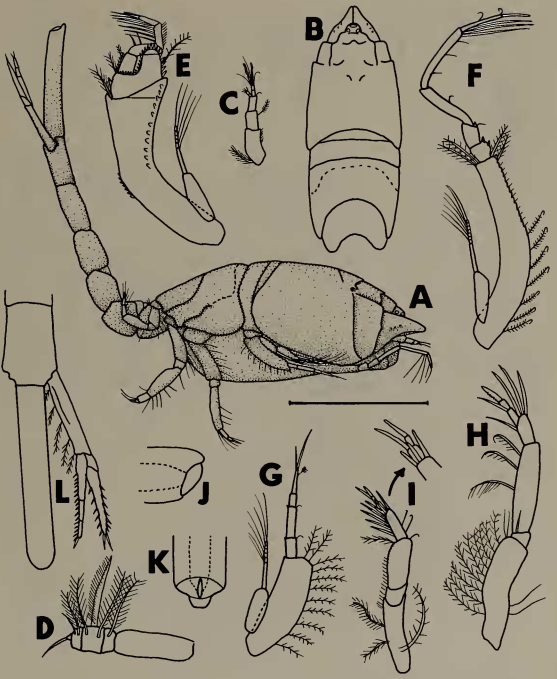

Fig. 12. *Dic formosae* sp. nov.
Ovigerous female. A. Lateral view. B. Dorsal view of cephalothorax, C. Antenna 1. D. Antenna 2. E. Maxilliped 3. F. Pereiopod 1. G. Pereiopod 2. H. Pereiopod 3. I. Pereiopod 5. J. Tip of telson in lateral view. K. Tip of telson in ventral view. L. Uropod and telson.
Scale line = 4 mm for A–B; 2 mm for C, E–I, L; 1 mm for D, J–K.

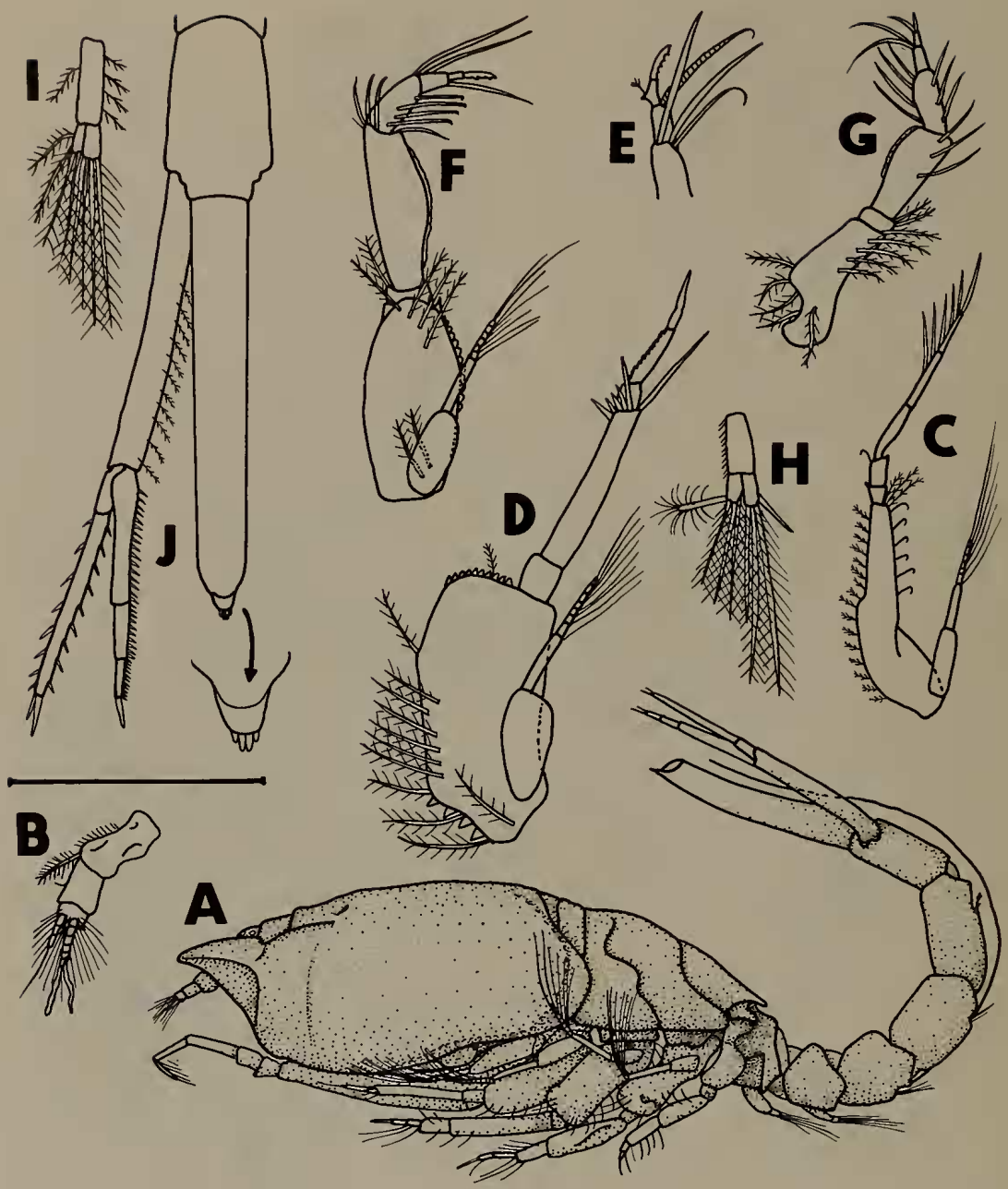

Fig. 13. *Dic formosae* sp. nov.

Adult male. A. Lateral view. B. Antenna 1. C. Pereiopod 1. D. Pereiopod 2. E. Tip of pereiopod 3. F. Pereiopod 3. G. Pereiopod 5. H. Pleopod 1. I. Pleopod 2. J. Uropod and telson.

Scale line = 4 mm for A, C; 2 mm for B, D, F–J; 1 mm for E.

Holotype

Ovigerous female, in the South African Museum, SAM–A15730, collected by UCT, 21 June 1972. Type locality: 80 mm on the Still Bay transect (24°40'S 21°39'E). UCT station number SST 26J.

Etymology

Formosus (L)—beautifully formed

Description

Ovigerous female, holotype, length 8,8 mm. General form very much as in *D. calmani.* Integument smooth, faintly reticulate with no hairs. Carapace (Fig. 12A) with two transverse ridges anteriorly (and sometimes a shorter one posteriorly). Pseudorostral lobes (Fig. 12B) fairly pointed. Eye with three lenses. Carapace very slightly wider than deep and fractionally more than twice as long as deep.

First pedigerous somite obscured laterally by posterior expansion of carapace and second by anterior expansion of third. Third and fourth pedigerous somites coalesced dorsally, fifth dorsal to fourth. Cephalothorax subequal in length to abdomen excluding telson; abdominal somites subcylindrical.

Antenna 1 (Fig. 12C) of moderate length, first segment slightly longer than next two subequal ones together. Both flagella short and 2-segmented. Antenna 2 (Fig. 12D) 5-segmented, first segment long and last very short with a stout spine.

Maxilliped 1 with numerous leaflike gill filaments. Maxilliped 3 (Fig. 12E) much wider distally than proximally. Ischium wider than long, greatly expanded on inner edge and excavated on outer edge to accommodate merus; bordered with very fragile denticles. Last four segments subequal in length.

Basis of pereiopod 1 (Fig. 12F) very slightly shorter than rest of limb. Carpus more than twice length of merus, slightly shorter than propodus. Pereiopod 2 (Fig. 12G) 6-segmented; basis wide, subequal in length to rest of limb; carpus distinctly longer than merus. Pereiopods 3 (Fig. 12H) and 4 similar: basis subequal in length to merus; carpus longer than propodus and dactyl together; dactyl with very strong serrate spine terminally. Basis of pereiopod 5 (Fig. 12I) slightly longer than merus, carpus nearly twice length of propodus and dactyl together.

Telsonic somite (Fig. 12L) one and a half times as long as wide. Telson in lateral view (Fig. 12J) rounded, anal valves posterior and almost terminal; in ventral view (Fig. 12K) with slight dorsal projection beyond anal valves. Telson more than twice length of telsonic somite, distinctly longer than uropods and quite cylindrical, without hairs, terminal spines or denticles. Peduncle of uropod subequal in length to telsonic somite, half length of telson, subequal in length to rami. First segment of endopod subequal in length to next two together.

Adult male, paratype, length 9,3 mm. As female, except as follows: carapace (Fig. 13A) nearly two and a half times as long as wide, transverse ridges (except on eyelobe) usually much less evident. Antennal notch excavated with a short dorsoventral ridge behind. First two and part of third pedigerous somites obscured laterally by posterior expansion of carapace, third not produced anteriorly. Fifth pedigerous somite produced to a point posteriorly. Abdominal somites grooved ventrally to accommodate flagellum of second antenna.

Third segment of antenna 1 (Fig. 13B) as wide as long with numerous fine setae. Flagellum 6-segmented and accessory flagellum 3-segmented. Flagellum of antenna 2 reaching almost to end of telson, consisting of 18 very long, sparsely setose segments. Basis of maxilliped 3 as wide proximally as distally. Basis of pereiopod 1 (Fig. 13C) subequal in length to rest of limb, last three segments subequal in length. Basis of pereiopod 2 (Fig. 13D) very wide; carpus two-thirds length of basis, nearly twice length of propodus and dactyl together. Dactyl of pereiopod 3 (Fig. 13E) small and projecting laterally. Basis and merus of pereiopods 3 (Fig. 13F) and 4 very stout. Basis of pereiopod 5 (Fig. 13G) excavated dorsally. Rami of pleopods (Fig. 13H) 1-segmented with long plumose setae.

Telsonic somite (Fig. 13J) nearly twice as long as wide, less than half length of telson. Telson with four short, blunt spines terminally on a short, projecting posterior flange. Peduncle of uropod two-thirds length of telson, rami extending well beyond tip of telson. Exopod very slightly longer than endopod, subequal in length to peduncle.

Length

Adult male	6,8–9,9 mm
Ovigerous female	7,3–10,3 mm

Remarks

D. formosae and *D. calmani* are the only two species of *Dic* possessing an almost tubular telson, and are very similar in general appearance. A number of distinguishing features are tabled below.

	D. calmani	*D. formosae*
integument	hairy, slightly translucent	reticulate, often highly calcified
ischium of maxilliped 3	rounded distally	notched to accommodate merus
pereiopod 1	basis subequal in length to carpus plus propodus	basis shorter than carpus plus propodus
pereiopod 2 ♀	merus and carpus subequal	merus two-thirds length of carpus
pereiopod 3 ♂	merus half width of basis, carpus a third length of basis	merus little narrower than basis, carpus nearly half length of basis
telson	anal valves ventral	anal valves posterior

	D. calmani	*D. formosae*
telson ♂ . . .	smoothly rounded terminally with about eight sharp denticles	slightly protruding terminally with four blunt spines
telson ♀ . . .	shorter than uropods	longer than uropods
uropods ♂ . .	endopod longer	rami subequal in length
uropods ♀ . . .	peduncle two-thirds length of telson, longer than rami	peduncle half length of telson, subequal in length to rami

Within *D. formosae* the carapace is variable: the integument may be almost smooth, is usually distinctly reticulate but may occasionally be rugose. The two major transverse ridges may extend laterally for only a short distance or may reach the ventral edge of the carapace. A third short dorsal transverse ridge may be present or absent.

Distribution

Saldanha Bay to Port Elizabeth at depths from 15 to 200 m. A very common species.

Dic platytelson sp. nov.

Fig. 14

Records

NIWR 29°S 31°E–26°S 32°E 75–100 m 2 adult ♀♀ (2 records)

Holotype

Adult female, in the South African Museum, SAM–A15731, collected by the NIWR, 3 September 1975. Type locality: 100 m, off the coast of Zululand (26°S 32°E). NIWR station number MN 75/24/H3.

Etymology

Platys (G)—broad, flat; telson (G)—a headland in ploughing (cf. telos—end), referring to the unusual configuration of the telson compared with that of other species in the genus.

Description

Adult female, holotype, length 6,2 mm. Integument well calcified, white, reticulate. Carapace (Fig. 14A) nearly twice as long as deep, with two transverse ridges, the first completely encircling the carapace about a third from anterior tip, second about midway along carapace and not reaching ventral edges. Pseudorostral lobes moderately long, roundly pointed in lateral view with short carinae midlaterally reaching from below eyelobe nearly to anterior transverse ridge. Antenna notch shallow and smoothly rounded. Carapace in dorsal view (Fig. 14B) nearly twice as long as deep, pseudorostrum narrow, about three times length of eyelobe. Eyelobe wider than long with three clear lenses. Carapace abruptly narrower in front of each transverse ridge.

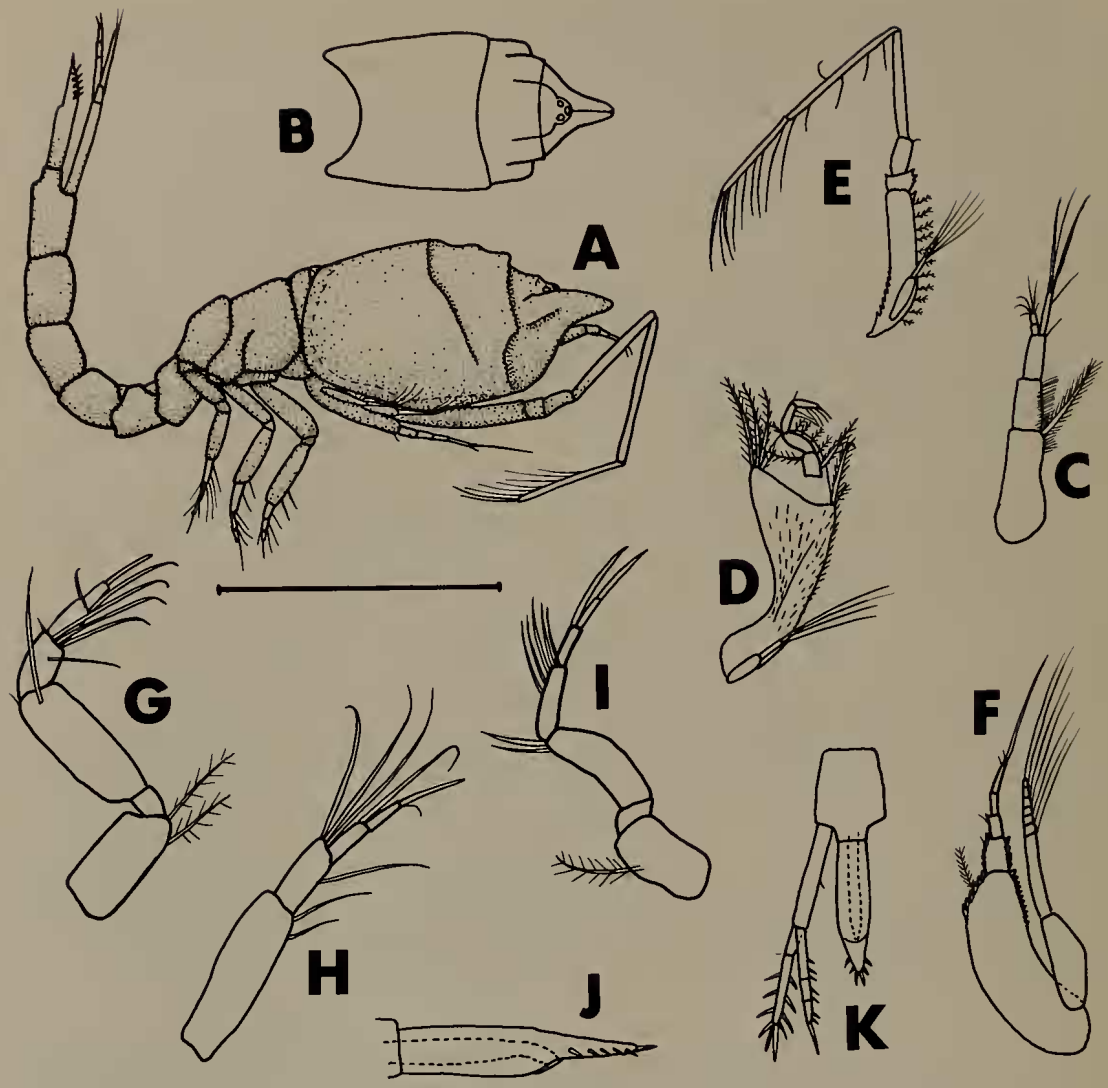

Fig. 14. *Dic platytelson* sp. nov.
Adult female. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Pereiopod 3. H. Pereiopod 4. I. Pereiopod 5. J. Telson in lateral view. K. Uropod and telson.
Scale line = 2 mm for A–B; 1 mm for D–I, K; 0,5 mm for C, J.

First two pedigerous somites visible dorsally only; third and fourth fused dorsally, third much wider laterally than fourth, fifth slightly dorsal. Abdominal somites subcylindrical, together subequal in length to cephalothorax.

Figures and descriptions of appendages (Figs 14C–I, K) are taken from the smaller damaged female and not the holotype.

Antenna 1 (Fig. 14C) moderately large, first segment subequal in length to next two together. Flagellum 1-segmented with two aesthetascs; accessory flagellum short and 2-segmented. Antenna 2 short and 3-segmented.

Basis of maxilliped 3 (Fig. 14D) enormously expanded distally, wider than length of next three segments together. Ischium widely expanded; last four segments short and subequal in length. Exopod small.

Pereiopod 1 (Fig. 14E) very long. Basis little more than a third length of rest of limb, serrated proximally on inner edge. Ischium wider than long, merus twice length of ischium; carpus twice length of ischium and merus together; propodus very slender, long, subequal in length to basis. Dactyl two-thirds length of propodus. Pereiopod 2 (Fig. 14F) 6-segmented. Basis very large, a third as wide as long, nearly twice length of remaining segments together. Distal segments short, exopod very large. Pereiopods 3 and 4 (Fig. 14G–H) without exopods. Basis of pereiopod 3 short, stout. Ischium very small, merus longer than basis. Last three segments of similar length, carpus with three long, hooked setae distally. Basis of pereiopod 5 (Fig. 14I) short; ischium wide, merus long and curved; last three segments elongate, carpus with five sharp setae distally.

Telsonic somite slightly longer than wide, protruding for a short distance between uropods. Telson (Fig. 14J–K) less than one and a half times length of telsonic somite, narrower for distal, post-anal third with five pairs of lateral and one pair of terminal spines. Peduncle of uropod nearly as long as telson; first segment of exopod a third length of second. Rami subequal in length, first segment of endopod about as long as next two together.

The *male* is unknown.

Length

Female 5,4–6,2 mm.

Remarks

With the very large ischium of the third maxilliped, this species is clearly a member of *Dic*. It is easily distinguished from the other two South African species by the long, spinose post-anal part of the telson and the very long distal segments of pereiopod 1. It is closest to *D. thileniusi* (Zimmer, 1902) from New Zealand, from which it is distinguished by its longer telson and shorter, fused third and fourth pedigerous somites.

Distribution

Known only from two samples from 75 and 100 m off northern Natal and Zululand.

Vemakylindrus Băcescu, 1961 (comb. nov.)

Generic diagnosis

Pseudorostrum long, approaching or exceeding length of carapace. Third and fourth pedigerous somites not fused. Exopods absent from pereiopods 3 and 4 of female. Male with two pairs of pleopods. Telson longer than telsonic somite, usually longer than peduncle of uropods.

Type species

V. gladiger (Băcescu, 1961*b*) (as *Makrokylindrus* (*Vemakylindrus*) *gladiger*).

Remarks

Justification for the elevation of *Vemakylindrus* from subgenus to genus is presented in the remarks on the family above. The long pseudorostrum is presumably of functional as well as of taxonomic significance, although why the exhalant siphon should be situated so far from the mouthparts is not clear. The telson is very variable in size, in the number of pairs of lateral spines and the length of the post-anal part so that some species approach *Diastylis* in this respect, while some are very close to *Makrokylindrus*.

Distribution

The genus is widely distributed, with species from the Mediterranean, the Pacific and the Arctic as well as one from South Africa. Most are very deep-water species, only one being known from 63 m and the rest from depths greater than 400 m.

KEY TO THE SPECIES OF *VEMAKYLINDRUS*

1 In lateral view, distance from anterior tip of eyelobe to distal tip of pseudorostrum (or siphon if longer) less than distance from anterior tip of eyelobe to posterior tip of carapace 2
– In lateral view, distance from anterior tip of eyelobe to distal tip of pseudorostrum (or siphon if longer) greater than distance from anterior tip of eyelobe to posterior tip of carapace 4
2 Distal third of telson with four pairs of lateral spines; carapace (excluding pseudorostrum) hardly longer than deep .. .. *V. doryphorus* (Fage, 1940)—Mediterranean
– Distal half of telson with five to nine pairs of lateral spines; carapace (excluding pseudorostrum) at least one and a half times as long as deep 3
3 Post-anal part of telson very narrow (about a quarter width of pre-anal part) with five pairs of lateral spines; angle between pseudorostrum and dorsum of carapace much more than 90° .. .. *V. hastatus* (Hansen, 1920)—Davis Strait
– Post-anal part of telson half width of pre-anal part with nine pairs of lateral spines; angle between pseudorostrum and dorsum of carapace about 90° *V. stebbingi* sp. nov.
4 Angle between pseudorostrum and dorsum of carapace about 90° 5
– Angle between pseudorostrum and dorsum of carapace more than 140° 6
5 Length from anterior tip of eyelobe to tip of pseudorostrum equal to length from anterior tip of eyelobe to posterior edge of last pereion somite
V. vemae (Băcescu, 1961*a*)—Mediterranean
– Length from anterior tip of eyelobe to tip of pseudorostrum equal to length from anterior tip of eyelobe to posterior edge of third pereion somite
V. charcoti (Reyss, 1974*b*)—Mediterranean
6 Length of carapace posterior to anterior tip of eyelobe shorter than free pereion somites together; telson with hardly any post-anal part
V. gladiger (Băcescu, 1961*b*)—Off Colombia
– Length of carapace posterior to anterior tip of eyelobe greater than free pereion somites together; telson (where known) with at least one-fifth its length post-anal .. 7
7 Endopod of uropod apparently 1-segmented and half length of peduncle
V. sp. A (Gamo, 1971)—Japan
– Endopod of uropod 3-segmented and a third length of peduncle or less 8

8 Carpus of pereiopod 2 about half length of basis; distal part of telson very strongly dentate dorsally .. .. *V. prolatus* (Jones, 1969)—Kermadec Trench
– Carpus of pereiopod 2 nearly as long as basis; distal part of telson finely serrate or smooth 9
9 Carapace dorsally with about nine pairs of spines very much larger than the majority; last two abdominal somites strongly dentate .. .. .. *V.* sp. B (Gamo, 1971)—Japan
– Carapace dorsally and laterally with many spines larger than the majority; last two abdominal somites minutely denticulate
V. costaricanus (Băcescu, 1961*b*)—Pacific coast of Costa Rica

Vemakylindrus stebbingi sp. nov.

Fig. 15

Records

SAM	34°S 17°E	800 m	1 subadult ♂, 1 ovig. ♀, 2 ♀♀ (1 record)
SM	30°S 30°E	850 m	1 ♀ (1 record)

Holotype

Subadult male, in the South African Museum, SAM–A15732, collected by the R.S. *Pieter Faure* in about 1900. Type locality: 800 m, off the Cape Peninsula (34°25′S 17°45′E). SAM station number SAM–A10602 (PF 17440).

Etymology

This species is named for the Rev. T. R. R. Stebbing, who contributed so much to our knowledge of southern African Cumacea.

Description

Subadult male, holotype, length 4,7 mm. Integument thin and reticulate. Carapace (Fig. 15A) and lower edge of siphon covered with very small denticles. Pseudorostral lobes not as long as rest of carapace, tilted upwards at angle of about 90° to dorsum. Entire anterior and ventral edges with very large hooked spines. Eyelobe small and eyeless. Carapace about one and a half times as long as wide at level of first antenna, twice length of pereion somites together.

First two pedigerous somites narrow, third and fourth slightly flanged laterally. Abdominal somites subcylindrical, fifth longest. Cephalothorax excluding pseudorostrum and abdomen excluding telson subequal in length.

Antenna 1 very large, protruding beyond tip of pseudorostrum. Three basal segments subequal in length. Flagellum 3-segmented and accessory flagellum very short and 1-segmented.

Basis of maxilliped 3 (Fig. 15B) stout and much longer than remaining segments together, with two spines at lower distal edge.

Pereiopod 1 (Fig. 15C) fairly stout, basis strongly spinose and about two-thirds length of remaining segments together. Merus twice length of ischium; carpus and propodus stout and subequal in length. Pereiopod 2 as in female. Pereiopods 3 to 5 stout, basis of pereiopod 3 longer than rest of limb and of pereiopod 5 much shorter.

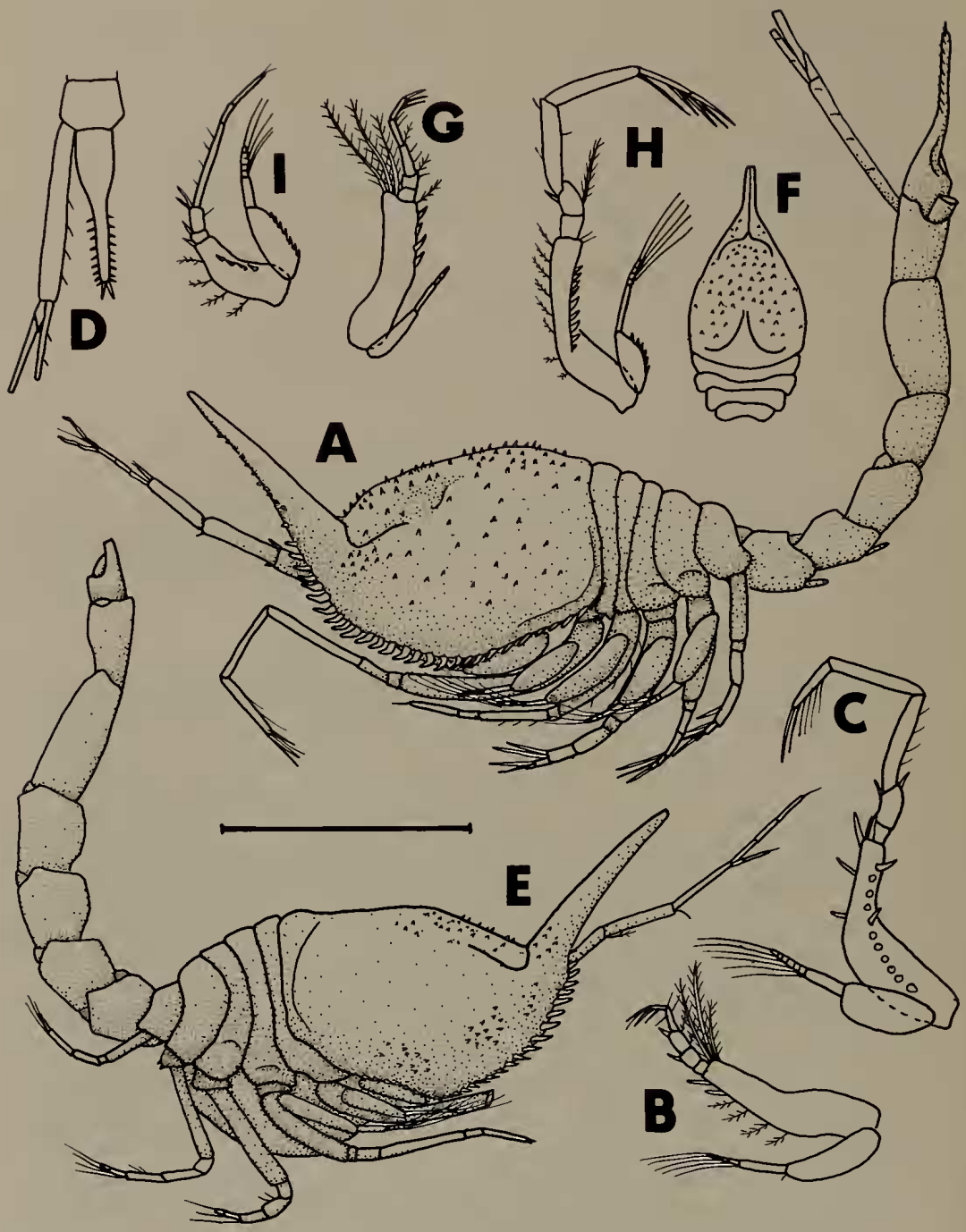

Fig. 15. *Vemakylindrus stebbingi* sp. nov.
Subadult male. A. Lateral view. B. Maxilliped 3. C. Pereiopod 1. D. Uropod and telson. Ovigerous female. E. Lateral view. F. Dorsal view of cephalothorax. G. Maxilliped 3. H. Pereiopod 1. I. Pereiopod 2.
Scale line = 2 mm for F; 1 mm for A, D–E; 0,5 mm for B–C, G–I.

Telsonic somite (Fig. 15D) slightly wider than long, about a third length of telson. Telson about twice as wide proximally as distally; pre-anal part about half length of post-anal part and smooth laterally. Post-anal part with about nine pairs of stout lateral spines. Peduncle of uropod slightly longer than telson, fairly stout and armed with three very fine hairs. First segment of endopod apparently long and slender; distal tips of both rami broken.

Ovigerous female, paratype, length 4,6 mm. As male except as follows: pseudorostrum (Fig. 15E) slightly shorter and more slender, not denticulate below. Carapace slightly longer and in dorsal view (Fig. 15F) stouter posteriorly. Abdominal somites stouter.

Distal segments of antenna 1 longer. Basis of maxilliped 3 (Fig. 15G) wider distally and segments more slender. Basis of pereiopod 1 (Fig. 15H) shorter and exopod longer. Pereiopod 2 (Fig. 15I) hardly reaching beyond distal tip of basis of pereiopod 1. Basis short and stout, exopod large. Carpus twice length of ischium and merus together; propodus and dactyl slender and together shorter than carpus. Pereiopods 3 and 4 more slender, lacking exopods. Pereiopod 5 shorter.

Telson broken immediately behind anus. Uropods missing.

Length

Subadult male 4,7 mm
Ovigerous female 4,5 mm

Remarks

This species is most similar to *V. hastatus* Hansen, 1920, from the Davis Strait. There are few significant differences between the present specimens and Hansen's rather limited figures. *V. hastatus* is more slender in build and the telson is about twice as long as the telsonic somite with five pairs of lateral spines. In *V. stebbingi* the telson is three times as long as the telsonic somite with nine pairs of lateral spines. Other minor differences include the lack of spines on the pedigerous somites and the more sharply angled pseudorostrum in *V. stebbingi*. The only other species in which the pseudorostrum is shorter than the rest of the carapace is *V. doryphora* in which the carapace is even shorter and the telson has only four pairs of lateral spines.

Distribution

Known from two records, one from 800 m off the Cape Peninsula and one from 850 m off Durban.

Makrokylindrus Stebbing, 1912

Generic diagnosis

Pseudorostrum less than a third total length of carapace. Third and fourth pedigerous somites coalesced (subgenus *Coalescuma*) or free (subgenus *Makrokylindrus*). Antenna 1 moderate to large. Bases of pereiopods 2 or 2 to 4 often

broad in adult male. Pereiopods 3 and 4 with exopods rudimentary or absent in female. Male with two pairs of pleopods. Pre-anal part of telson cylindrical or subcylindrical, longer and stouter than post-anal part with zero to six pairs of lateral spines. Terminal spines present or absent. Endopod of uropod 2- or 3-segmented.

Type species

M. fragilis Stebbing, 1912 from South Africa.

Remarks

The problem of distinction between *Makrokylindrus* and *Diastylis* is discussed on page 221 above. The author is aware that the generic diagnoses given here are little improvement on those already available, but hopes to find more satisfactory diagnostic characters in a future revision of these genera.

There are at present about forty-seven species in the genus. The specimen : species ratio in the genus is very low and many species are known from only a few individuals. Thus some forms described may be merely slight variants of a single species. With little material available from deep water the degree of variability is not known and in the key below no attempt has been made to fuse previously described species which may well prove to be synonymous.

Distribution

Four species have previously been found off the south-east coast of southern Africa. Two of these, *Makrokylindrus fragilis* and *M. acanthodes*, are available in the present collection, together with five new species, all from depths greater than 500 m.

The genus is a deep-water one and includes the deepest record for a cumacean, *M. hadalis*, from 7 160 m in the Java Trench. Only three species are known from depths of less than 350 m, and two of these are doubtful members of the genus.

KEY TO THE SPECIES OF *MAKROKYLINDRUS*

Note: 'pre-anal' refers to the portion of the telson anterior to the beginning of the anal valves; 'post-anal' refers to the portion posterior to the beginning of the anal valves. When measuring the length of the telson in relation to the uropods, it is assumed that they are in place in the animal and are parallel to each other, since the peduncle is usually inserted anterior to the insertion of the telson. Characters of the uropods and telson are of greatest value in separating species, but since these parts are often damaged, other features are included where possible.

M. mersus is included twice in the key because the tip of the telson is unknown. Both it and *M. fistularis* are doubtful members of the genus in the presence of inadequate information.

1 Pre-anal part of telson at least twice length of post-anal part 2
– Pre-anal part of telson no more than one and a half times length of post-anal part .. 29
2 Anal valves almost terminal, less than a quarter of telson post-anal 3
– A quarter or more of telson post-anal 14
3 Third and fourth pedigerous somites coalesced dorsally 4
– Third and fourth pedigerous somites not coalesced dorsally 8
4 Integument without spines or denticles; carapace with three or four pairs of longitudinal ridges; telson reaching beyond tip of rami of uropods
M. fistularis (Calman, 1911)—Gulf of Siam
– Spines and/or denticles present at least anteriorly on carapace; carapace without longitudinal ridges; telson not reaching tip of rami of uropods 5
5 Carapace less than twice as long as deep with two transverse rows of spines larger than the rest .. .. *M. cinctus* Jones, 1969—off Bali
– Carapace at least twice as long as deep with spines of equal length 6
6 Endopod of uropod approaching length of peduncle; carpus of pereiopod 2 subequal in length to basis .. .. *M. mersus* Jones, 1969—Tasman Sea
– Endopod of uropod no more than half length of peduncle; carpus of pereiopod 2 half length of basis or less 7
7 Basal portion of telson laterally serrate; telson almost reaching distal tip of uropods with one pair of lateral spines .. .. *M. menziesi* Băcescu, 1962—Galapagos
– Basal portion of telson smooth; telson not reaching distal tip of peduncle of uropod and lacking lateral spines (has several fine hairs)
M. reyssi Băcescu, 1972—north-west Africa
8 Anterolateral corner of carapace quite smooth or minutely tuberculate 9
– Anterolateral corner of carapace dentate or serrate 10
9 Integument smooth with a few fine hairs; telson shorter than last three abdominal somites together, with one pair of terminal spines *M. alleni* Reyss, 1974*a*—Canary Is.
– Integument minutely denticulate, without hairs; telson distinctly longer than last three abdominal somites together, without terminal spines
M. fagei Băcescu, 1962—Madagascar
10 Spines confined to dorsal and anterior parts of carapace, with one pair on some pereion and pleon somites; telson hardly as long as last two abdominal somites togethe r .. .. *M. myriamae* Reyss, 1974*a*—North Atlantic
– Entire integument covered with many slender spines; telson longer than last two abdominal somites together 11
11 Carapace a third of total length of body including telson; telson smooth
M. americanus Băcescu, 1962—tropical Eastern Pacific
– Carapace a quarter total length of body including telson; distal half of telson denticulate 12
12 Telson reaching beyond distal tip of endopod of uropod; basis of pereiopod 1 subequal in length to carpus and propodus together
M. tubulicaudatus (Calman, 1904)—North Atlantic
– Telson not reaching distal tip of endopod of uropod; basis of pereiopod 1 two-thirds length of carpus and propodus together 13
13 Carpus of pereiopod 2 longer than three preceding segments together and entire limb longer than carapace; telson reaching distal tip of peduncle of uropod
M. hadalis Jones, 1969—Java Trench
– Carpus of pereiopod 2 about as long as basis and entire limb shorter than carapace; telson reaching almost to tip of endopod of uropod .. .. *M. spinifer* sp. nov.
14 Carapace entirely lacking spines, denticles or tubercles even at ventrolateral edge .. 15
– Carapace with spines, denticles or tubercles at ventrolateral edge or elsewhere .. 16
15 Pedigerous somites 3 and 4 coalesced; telson reaching first segment of endopod of uropod .. .. *M. mundus* sp. nov.
– Pedigerous somites 3 and 4 not coalesced; telson reaching third segment of endopod of uropod .. .. *M. gibraltarensis* Băcescu, 1961*a*—Mediterranean
16 Carapace with one or two strong transverse ridges around entire width 17
– Carapace without transverse ridges, or those present weak and confined to dorsal part 20

17 Sides of carapace smooth without scattered spines 18
– Sides of carapace roughened by many small scattered spines 19
18 Carapace with one transverse ridge; endopod of uropod longer than exopod; telsonic somite little produced between uropods *M. fragilis* Stebbing, 1912—South Africa
– Carapace with two transverse ridges; endopod of uropod shorter than exopod; telsonic somite produced between uropods for nearly half its length *M. deinotelson* sp. nov.
19 Telson as long as last two abdominal somites together with several pairs of lateral spines .. .. *M.* sp. Gamo—Japan
– Telson subequal in length to last three abdominal somites together with one pair of lateral spines .. .. *M. cingulatus* (Calman, 1905*b*)—Malaya
20 Pseudorostrum nearly a third of total length of carapace with a few denticles above: rest of carapace unsculptured; pereion and pleon minutely denticulate above *M. baceskei* Lomakina, 1968—Antarctic
– Pseudorostrum distinctly less than a third of total length of carapace, denticles not confined to pseudorostrum; pereion and pleon armed or not 21
21 Pedigerous somites 3 and 4 coalesced dorsally 22
– Pedigerous somites 3 and 4 not coalesced dorsally 24
22 Basal part of telson quite smooth laterally .. *M. mersus* Jones, 1969—Tasman Sea
– Basal part of telson serrate or dentate laterally 23
23 Telson slightly longer than last two abdominal somites together with about five pairs of lateral spines; spines on carapace concentrated anteriorly *M. balinensis* Jones, 1969—off Bali
– Telson at least as long as last three abdominal somites together with 0 to 1 pair of lateral spines; spines scattered over entire carapace *M. josephinae* (Sars, 1871)—North Atlantic
24 Post-anal part of telson deeply serrated and lacking lateral spines *M. serricaudus* (Scott, 1912)—North Atlantic
– Post-anal part of telson not serrated but with 0 to four pairs of lateral spines .. 25
25 Telson no longer than last two abdominal somites together 26
– Telson longer than last two abdominal somites together 27
26 Eyelobe, frontal lobe and pseudorostrum spinulose *M. sandersi* Reyss, 1974*a*—North Atlantic
– Eyelobe, frontal lobe and pseudorostrum not spinulose *M. hessleri* Reyss, 1974*a*—North Atlantic
27 Basal segment of antenna 1 shorter than next two together; 1–4 pairs very small lateral spines on telson .. .. *M. longipes* (Sars, 1871)—Bay of Biscay
– Basal segment of antenna 1 longer than next two together; no lateral spines on telson 28
28 Carapace with a pair of anterolateral horns lateral to frontal lobes; last three pedigerous somites each with a pair of large dorsolateral spines .. *M. bicornis* sp. nov.
– Carapace without anterolateral horns; last three pedigerous somites without spines *M. wolffi* Băcescu, 1962—south-eastern Africa
29 Carapace with two pairs of strong unserrated carinae *M. bacescui* Brum, 1971—Brazil
– Carapace without carinae, or with one pair of unserrated or two or more pairs of serrated carinae 30
30 Anterolateral edge of carapace smooth; carapace large, globular with no spines or sculpturing .. .. *M. inermis* Fage, 1929—Azores
– Anterolateral edge of carapace with spines or fine serrations; spines and/or sculpturing of carapace variable 31
31 Telson (excluding terminal spines) no longer than last two abdominal somites together 32
– Telson (excluding terminal spines) longer than last two abdominal somites together 40
32 Front half or more of carapace with evenly distributed spines or denticles of more or less uniform length; large spines if present confined to frontal lobe and/or pseudorostrum 33
– Front half or more of carapace without spines or denticles, or those present unevenly distributed; large spines or denticles, if present, not confined to frontal lobe and/or pseudorostrum 37

33 Particularly large spines absent from frontal lobe and pseudorostrum, or confined to an anterolateral flange around pseudorostrum 34
– One or more pairs of spines on frontal lobe and/or pseudorostrum at least twice length of the majority 36
34 Carapace bordered by anterolateral dentate flange or keel; endopod of uropod 2-segmented .. .. *M. mystacinus* (Sars, 1887)—North Atlantic
– Carapace with no dentate flange or keel; endopod of uropod 3- (or possibly 2-) segmented 35
35 Endopod of uropod shorter than exopod; pleon somites without spines in female (male unknown) .. .. *M. longicaudatus* (Bonnier, 1896)—North Atlantic
– Rami of uropod subequal in length; first three pleon somites with a pair of large dorsolateral spines in female and none in male .. .. *M. aculeatus* sp. nov.
36 Telson without lateral spines; pseudorostrum with two pairs of large erect spines *M. monodi* Reyss, 1974*a*—North Atlantic
– Telson with six pairs of lateral spines; frontal lobe with two pairs of large erect spines *M. peresi* Reyss, 1974*a*—North Atlantic
37 Third and fourth pedigerous somites coalesced middorsally; carapace with enormous, sometimes bifid, spines .. .. *M. aegaeus* Reyss, 1974*b*—Mediterranean
– Third and fourth pedigerous somites not coalesced middorsally; larger spines or denticles not bifid 38
38 Telson shorter than peduncle of uropod; major spines of carapace situated on raised protuberances .. .. *M. acanthodes* (Stebbing, 1912)—South Africa
– Telson longer than peduncle of uropods; major spines of carapace not thus situated 39
39 Carapace with several irregular transverse ridges; telson with five pairs of lateral spines .. .. *M. inscriptus* Jones, 1971—Antarctic
– Carapace shallowly pitted with five pairs of spines laterally on and behind pseudorostrum; telson with three pairs of lateral spines *M. armatus* (Norman, 1879)—Arctic
40 Carapace with a single pair of large, pointed lateral horns *M. insignis* (Sars, 1871)—North Atlantic
– Carapace without lateral horns 41
41 Telson with a narrowed collar behind the anus *M. abyssi* Lomakina, 1955—Arctic
– Telson with no narrowed collar behind anus 42
42 Carapace with one or more rows of spines or denticles 43
– Spines or denticles on carapace not arranged in rows 44
43 Carapace with several oblique ridges running down from posterior middorsal line towards anterolateral edge .. *M. costatus* (Bonnier, 1896)—North Atlantic
– Carapace with no obvious oblique ridges; a row of small tubercles may run obliquely upwards from posterolateral edge towards eyelobe *M. neptunius* Jones, 1969—Tasman Sea
44 Pereion and pleon quite devoid of spines or denticles 45
– Pereion and pleon with spines and/or denticles 46
45 Denticles confined to anterior third of carapace; telson with five pairs of lateral spines *M. vitiasi* Lomakina, 1958—Kamchatka
– Denticles scattered over entire carapace; telson apparently without lateral spines *M. Iomakinae* Băcescu, 1962—south-east Africa
46* Carapace, pereion and pleon with some spines much larger than the rest; telson with three pairs of lateral spines .. *M. anomalus* (Bonnier, 1896)—North Atlantic
– Carapace, pereion and pleon with spines of uniform length; telson with no more than one pair of lateral spines 47
47 Tip of pereiopod 1 not reaching end of carapace anteriorly, basis almost as long as rest of limb; telson with one pair of lateral spines *M. stocki* Reyss, 1974*a*—North Atlantic
– Pereiopod 1 reaching beyond anterior tip of carapace for half its length, basis subequal in length to carpus and propodus together; telson without lateral spines *M. erinaceus* (Sars, 1887)—North Atlantic

* *A. jedsi* cannot be keyed beyond this point because of the incomplete nature of the existing specimens.

Makrokylindrus fragilis Stebbing, 1912

Fig. 16

Makrokylindrus fragilis Stebbing, 1912: 150–152, pls. 54–55; 1913: 117–118, figs 72–73.

Records

SM & SAM	30°S 30°E–30°S 31°E	805–900 m	1 adult ♂, 1 subadult ♂, 2 ♂♂, 1 ovig. ♀, 9 ♀♀ (3 records, including paratypes from SAM–A10601)

Previous records

Syntypes only.

Syntypes

Deposited by Stebbing in the British Museum (Natural History). Type locality: 805 m off Durban (30°33′S 30°58′E).

Description

Ovigerous female, length 10,9 mm. Integument minutely reticulate, lightly calcified. Carapace (Fig. 16A) less than twice as long as deep with a strong ridge running transversely around entire width and with two short longitudinal ridges branching from the major one, one short pair ventrolaterally and the other midlaterally, reaching posterior edge of pseudorostrum. Transverse and upper lateral ridges with fine hairs, lateral one interspersed with several strong teeth (which are easily damaged or lost). Pseudorostrum (Fig. 16B) short and pointed with several small denticles. Eyelobe small, rounded, eyeless. Carapace widest immediately behind transverse ridge. Anterolateral angle and antennal notch wanting, anterolateral edge strongly serrated.

First pedigerous somite obscured laterally, second narrow, third and fourth coalesced. Marsupium large. Abdominal somites subcylindrical, abdomen including telson slightly longer than cephalothorax. Pedigerous and abdominal somites entirely lacking spines and denticles.

Antenna 1 (Fig. 16C) long and slender, protruding beyond anterior tip of pseudorostrum. Three basal segments subequal in length; flagellum 5-segmented and accessory flagellum shorter and 3-segmented. Antenna 2 (Fig. 16D) short, 3-segmented; first segment very stout.

Basis of maxilliped 3 (Fig. 16E) considerably produced distally, reaching half-way along merus. Ischium short, remaining segments subequal in length. Exopod short.

Basis of pereiopod 1 (Fig. 16F) strongly setose on both edges with a row of spines below. Ischium and merus subequal in length. Part of carpus present, remaining segments missing. Pereiopod 2 (Fig. 16G) slender, basis slightly longer than next three segments together. Ischium very small; carpus longest of remaining segments. Pereiopod 3 (Fig. 16H) and 4 similar, slender, without exopods. Pereiopod 5 shorter and still more slender.

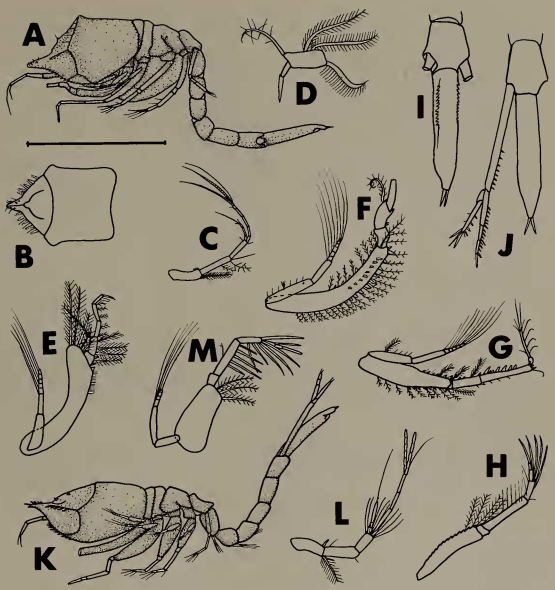

Fig. 16. *Makrokylindrus fragilis.*
Ovigerous female. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Antenna 2. E. Maxilliped 3. F. Pereiopod 1. G. Pereiopod 2. H. Pereiopod 3. I. Dorsolateral view of telson. J. Uropod and telson of younger female.
Adult male. K. Lateral view. L. Antenna 1. M. Pereiopod 2.
Scale line = 4 mm for A–B, K; 2 mm for C, E–J, L–M; 1 mm for D.

Telson (Fig. 16I) elongate, subequal in length to last three abdominal somites together, slightly keeled and serrate on lateral borders of proximal half. About a quarter of telson post-anal, smooth, with a single pair of terminal spines. Uropods missing from ovigerous female. Uropod (Fig. 16J) of young female slender, peduncle reaching level of anus. Exopod about three-quarters length of 3-segmented endopod and about half length of peduncle. First segment of endopod subequal in length to next two together.

Adult male, length 10,6 mm. As female, except as follows: carapace (Fig. 16K) much shallower, transverse ridge more clearly interrupted by branching of longitudinal ridges. Denticles of pseudorostrum, ventrolateral edge and transverse ridges larger. A few denticles scattered on eyelobe. Last three pedigerous somites relatively larger.

Antenna 1 (Fig. 16L) stouter, first and third segments slightly shorter; flagella surrounded by numerous short sensory setae; flagellum longer and 4-segmented. Basis of maxilliped 3 stouter. Distal segments of pereiopod 1 missing. Basis of pereiopod 2 very stout, longer relative to distal segments. Bases of pereiopods 3 (Fig. 16M) and 4 very stout, less than twice as long as wide, exopods rather long and slender. Basis of pereiopod 4 shorter than that of pereiopod 3. Pleopods rather short. Uropod and telson as in female.

Length

Adult male	10,6 mm
Ovigerous female	10,9 mm

Remarks

These specimens correspond well with Stebbing's figures except for a few discrepancies in the figures of the whole animal. The sculpturing of the carapace is quite distinctive and cannot be confused with that of any other species of *Makrokylindrus*.

Distribution

Known from three samples from the region of the type locality: 805 to 900 m off Durban and vicinity.

Makrokylindrus deinotelson sp. nov.

Fig. 17

Records

SM 27°S 32°E 550 m 1 ♀, 2 juvs (1 record)

Holotype

Female, in the South African Museum, SAM–A15733, collected by the SAM, 22 May 1976. Type locality: 550 m, in the southern Mozambique Channel, (27°59′S 32°40′E). SAM station number SM 86.

Etymology

Deinos (G)—terrible, peculiar; telson (G)—a headland in ploughing (cf. telos—end), referring to the unusual conformation of the telson.

Description

Female, holotype, length 6,8 mm. Broken in two, but otherwise undamaged. Integument thin, very lightly calcified, rugose posteriorly on carapace, otherwise lightly reticulate. Carapace (Fig. 17A) about one and a half times as long

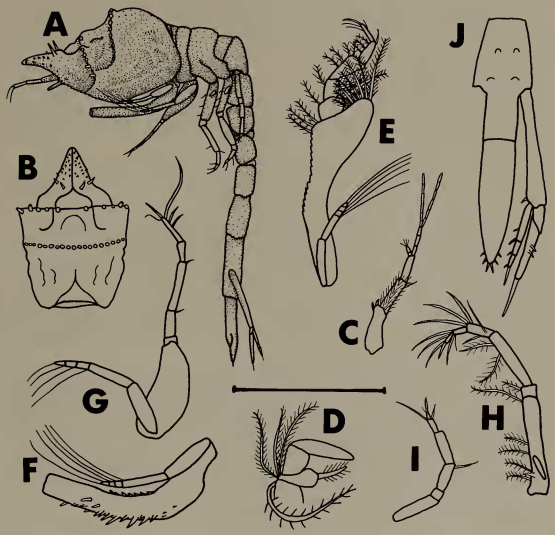

Fig. 17. *Makrokylindrus deinotelson* sp. nov.
Female. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Antenna 2. E. Maxilliped 3. F. Basis of pereiopod 1. G. Pereiopod 2. H. Pereiopod 3. I. Pereiopod 5. J. Uropod and telson.
Scale line = 2 mm for A–B; 1 mm for C, E–J; 0,5 mm for D.

as deep with two very strong transverse ridges meeting laterally. Posterior ridge tuberculate, slightly posterior to middle of carapace, bearing remains of spines and forming deepest part of carapace, turning forward below midlateral level to meet anterior transverse ridge which encircles entire carapace about a third from anterior edge, bears some tubercles and broken spines and forms the widest part of the carapace. Pseudorostrum (Fig. 17B) moderately long, with scattered denticles and spines. Eyelobe very small and triangular. No antennal notch present, anterolateral edge minutely serrated. Posterior part of carapace lightly rugose.

First and part of second pedigerous somites obscured laterally by postero-lateral extension of carapace, third and fourth narrow and coalesced dorsally. Cephalothorax and abdomen (excluding telson) subequal in length. Abdominal somites subcylindrical.

Antenna 1 (Fig. 17C) fairly long, first and second segments subequal in length, second finely setose, third slightly shorter. Accessory flagellum short and 2-segmented, flagellum 3-segmented. Antenna 2 (Fig. 17D) fairly large, 4-segmented; last segment longest.

Basis of maxilliped 3 (Fig. 17E) very large, expanded distally to reach level of merus and much wider here with numerous plumose setae. Ischium fairly large, last four segments subequal in length.

Distal segments of pereiopod 1 missing. Basis (Fig. 17F) fairly stout with numerous spines on lower edge. Basis of pereiopod 2 (Fig. 17G) short and stout, about two and a half times as long as wide, unarmed; ischium short; carpus longest of remaining segments, subequal in length to propodus and dactyl together. Pereiopods 3 (Fig. 17H) and 4 with a very small, 1-segmented exopod. Merus longest of distal segments; last three segments each shorter than preceding one. Pereiopod 5 (Fig. 17I) similar to pereiopod 4 but basis and merus much shorter.

Telsonic somite (Fig. 17J) very long, twice as long as wide and nearly three times as long as deep, protruding between uropods for nearly half its length and subequal in length to telson. Telson with less than a third its length post-anal, tapering posteriorly with one pair of spines terminally and two pairs laterally, almost reaching posterior tip of rami of uropod. Distal tip of peduncle of uropod reaching half-way down telson, slightly less than twice length of endopod. Exopod slightly longer than endopod; endopod 3-segmented, first segment subequal in length to next two together.

The *male* is unknown.

Length

Female 6,8 mm.

Remarks

As the specific name indicates, the telson and telsonic somite of this species are unique in that the telsonic somite protrudes well beyond the insertion of the uropods. Thus although the telson is no longer than the telsonic somite, the length of the telson plus telsonic somite posterior to the insertion of the uropods is comparable with that of many species of *Makrokylindrus*. The character may prove worthy of generic distinction, but it does not seem to be sufficiently unusual to warrant the erection of a new genus on the basis of three individuals, none of which is adult.

M. deinotelson is easily distinguished from all other species in the genus by this character alone. But in other respects it resembles *M. fragilis*, *M. cinctus* Jones, 1969, and *M. cingulatus* (Calman, 1905*b*), all of which have transverse

ridges on the carapace. In both *M. cinctus* and *M. cingulatus* the carapace bears scattered spines apart from those on the transverse ridge(s) and *M. fragilis* has a single transverse ridge.

Distribution

Known only from a single sample from 550 m in the southern Mozambique Channel.

Makrokylindrus mundus sp. nov.
Fig. 18

Records

SM 27°S 32°E 800–810 m 1 ♀ (1 record)

Holotype

Female, in the South African Museum, SAM-A15734, collected by the SAM, 19 May 1976. Type locality: 800–810 m, in the southern Mozambique Channel (27°09′S 32°58′E).

Etymology

Mundus (L)—neat, elegant, referring to the fact that the animal is unadorned.

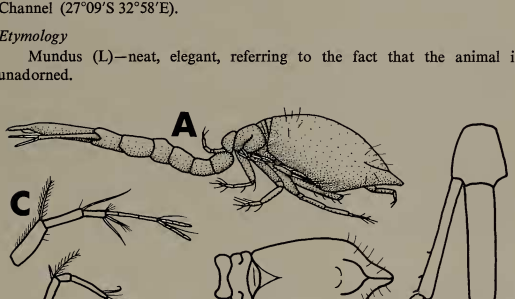

Fig. 18. *Makrokylindrus mundus* sp. nov.
Female. A. Lateral view. B. Dorsal view of cephalothorax. C. Antenna 1. D. Pereiopod 2. E. Pereiopod 3. F. Pereiopod 5. G. Uropod and telson.
Scale line = 2 mm for A–B; 1 mm for C–G.

Description

Female, *holotype*, length 5,4 mm. Integument very lightly calcified, smooth and faintly reticulate, with no spines or denticles but with a few hairs on the carapace. Carapace (Fig. 18A) elongate-oval, slightly more than twice as long as deep with no antennal notch or anterolateral angle. Pseudorostrum (Fig. 18B) fairly short and wide; eyelobe small, triangular and eyeless.

First and part of second pedigerous somites obscured by posterolateral expansion of carapace; third and fourth coalesced dorsally; fifth short. Abdominal somites subcylindrical, together barely longer than carapace.

Antenna 1 (Fig. 18C) fairly long, first segment slightly longer than second, and twice as long as third. Flagellum long and 3-segmented, accessory flagellum short and 2-segmented.

Antenna 2 very similar to that of *M. deinotelson* and maxilliped 3 similar to that of *M. fragilis*, but ischium slightly longer.

Segments distal to basis of pereiopod 1 missing. Pereiopod 2 (Fig. 18D) long and slender; exopod fairly large and elongate. Basis narrow, subequal in length to merus and carpus together; ischium short; carpus equal in length to propodus and dactyl together. Pereiopods 3 (Fig. 18E) and 4 similar, with fairly large exopods. Basis fairly stout, little longer than merus. Pereiopod 5 (Fig. 18F) short, merus and carpus subequal in length.

Telsonic somite (Fig. 18G) wider than long, less than a third length of telson. Telson longer than last three abdominal somites together, cylindrical for most of its length. Post-anal part a third of total length, tapering to tip with three pairs of lateral and one pair of terminal spines. Telson almost reaching posterior tip of first segment of endopod. Endopod 3-segmented, its first segment subequal in length to next two together. Rami subequal in length.

The *male* is unknown.

Length

Female 5,4 mm.

Remarks

This species is closest to *M. longipes* (Sars, 1871) but is distinguished by the smooth integument without any spines or denticles, the fusion of the third and fourth pedigerous somites, the shorter carpus of pereiopod 2 and the relatively longer telson. Although it is rather unlike most other species of *Makrokylindrus* in the unarmed integument, *M. mundus* is placed in the genus because of its very characteristic telson.

Distribution

A single female known from 800–810 m in the southern Mozambique Channel.

Makrokylindris spinifer sp. nov.

Figs 19–20

Records

SAM (PF 17440)	34°S 17°E	800 m	1 adult ♂, 1 ♀ (1 record)
SM	27°S 32°E–30°S 31°E	800–900 m	1 ovig. ♀, 4 ♀♀ (2 records)

Holotype

Young female, in the South African Museum, SAM–A15735, collected by the SAM, 19 May 1976. Type locality: 800–810 m, in the southern Mozambique Channel (27°09′S 32°58′E). South African Museum station number SM 60.

Etymology

Spina (L)—a thorn; ferre (L)—to bear, referring to the spiny exoskeleton.

Description

Young female, holotype, length 6,2 mm. Entire integument strongly spinose and lightly calcified. Carapace (Fig. 19A) less than twice as long as deep, shallowly arched dorsally, evenly covered with moderately large, sharp spines. Spines at ventral edge particularly long, especially anteriorly. Pseudorostrum (Fig. 19B) rather short, blunt; eyelobe small and eyeless.

All five pedigerous somites moderately wide and last situated somewhat dorsally; together about half length of carapace. Abdominal somites subcylindrical, spinose, fifth longest. Abdomen (excluding telson) subequal in length to cephalothorax.

Antenna 1 (Fig. 19C) large; first segment slightly longer than next two subequal, spinose segments together. Accessory flagellum short and 3-segmented, flagellum much longer and 3-segmented.

Basis of maxilliped 3 (Fig. 19D) not much wider distally than proximally with a single row of spines on lower edge. Ischium and merus subequal in length, carpus slightly longer. Exopod small.

Pereiopod 1 (Fig. 19E) very long and strongly spinose on all segments except dactyl. Basis equal in length to next three segments together; carpus and propodus subequal in length, each hardly shorter than basis; dactyl short. Basis of pereiopod 2 (Fig. 19F) very short and stout, twice as long as wide with very large exopod. Ischium short, merus slightly longer; carpus subequal in length to basis, ischium and merus together and longer than propodus and dactyl together, with small spines. Pereiopods 3 (Fig. 19G) and 4 similar, slender and spinose. Basis of pereiopod 3 longer than rest of limb and of pereiopod 4 slightly shorter. Pereiopod 5 (Fig. 19H) with a few spines on basis and merus only.

Telsonic somite (Fig. 19I) about as long as wide, less than a quarter length of telson. Telson very long, tubular and spinose, considerably longer than last three abdominal somites together; post-anal part a small fraction of total

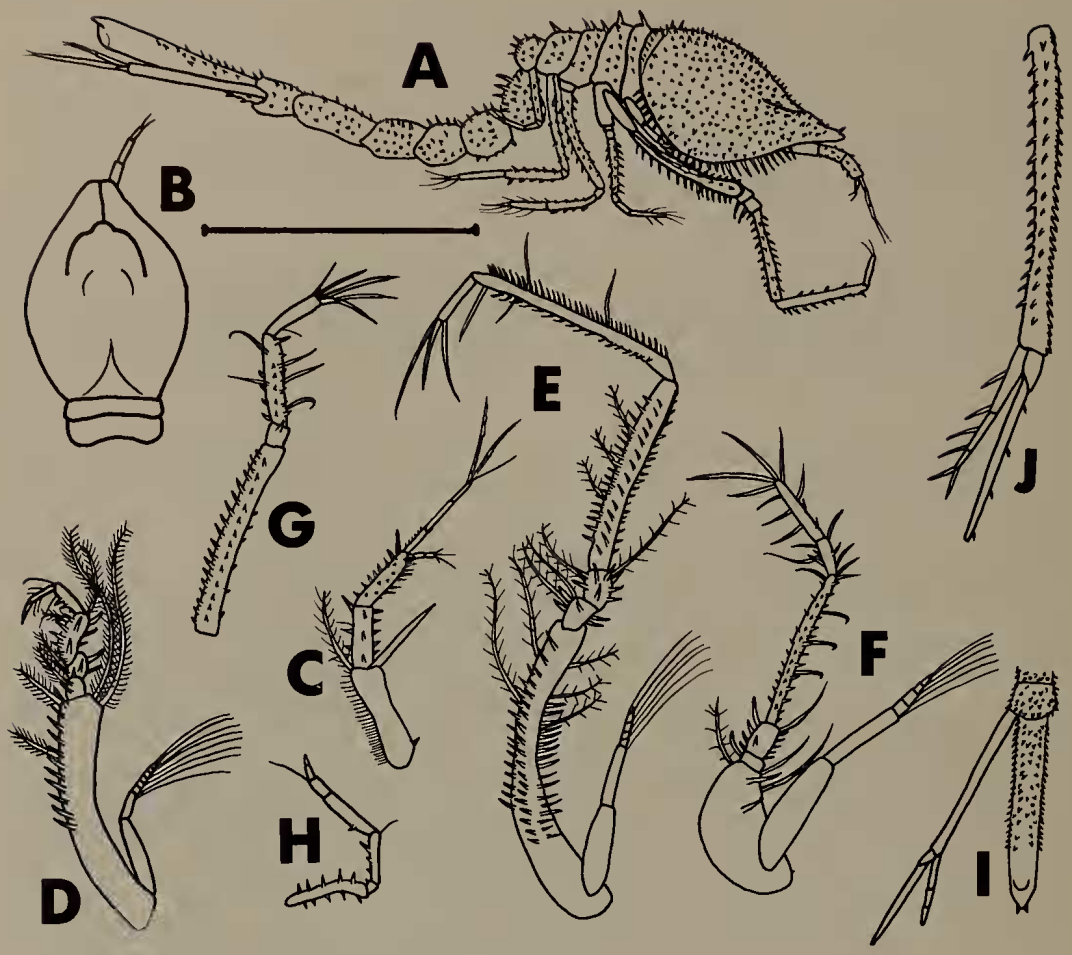

Fig. 19. *Makrokylindrus spinifer* sp. nov.
Young female. A. Lateral view. B. Dorsal view of carapace (spines omitted). C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Pereiopod 3. H. Pereiopod 5. I. Uropod and telson. J. Uropod.
Scale line = 2 mm for A–B, I; 1 mm for C–H, J.

length with a single pair of terminal spines. Peduncle of uropod slender, tip not reaching level of anus. Endopod (Fig. 19J) 3-segmented, about three-quarters length of exopod and less than half length of peduncle; first segment slightly longer than next two together.

Adult male, length 9,4 mm (SAM–A10602). As female except as follows: antennal notch (Fig. 20A) visible beneath large spines at anterolateral edge. First two pedigerous somites flanged laterally.

Third segment of antenna 1 (Fig. 20B) shorter and stouter with a large number of sensory setae around flagella. Flagellum 4-segmented. Carpus of maxilliped 3 shorter. Basis of pereiopod 2 less spinose. Basis of pereiopod 3 (Fig. 20C) stouter at base with a single row of spines at outer edge; exopod long and slender. Telson excavate dorsally (Fig. 20D) anterior to anus and

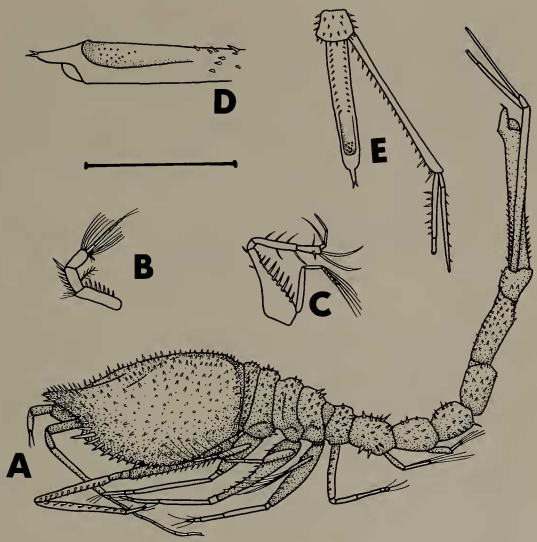

Fig. 20. *Makrokylindrus spinifer* sp. nov.
Adult male. A. Lateral view. B. Antenna 1. C. Pereiopod 3. D. Telson in dorsolateral view. E. Uropod and telson.
Scale line = 2 mm for A; 1 mm for B–E.

much narrower at distal tip. Peduncle of uropod (Fig. 20E) considerably longer, almost reaching distal tip of telson. First segment of endopod much longer, second damaged and third missing.

Length

Adult male	9,4 mm
Largest female	9,6 mm

Remarks

Despite the fact that this species occurs at the relatively shallow depths of less than 1 000 m, and *M. hadalis* Jones, 1969, occurs at more than 7 000 m,

the two species are remarkably similar in all respects. The distinguishing features are ones of degree rather than absolute differences, but the species none the less appear to be distinct. In *M. hadalis* the spines covering the body are longer, more slender and more numerous, the appendages (especially the pereiopods) are longer and more slender, the carpus of pereiopod 2 in particular is longer and the uropods are longer and more slender. *M. hadalis* is known only from immature males. When adults become available the nature of the distal tip of the telson should determine whether or not these two species are synonymous.

Distribution

Known at depths from 800 to 900 m from the southern Mozambique Channel to the Cape Peninsula.

Makrokylindrus bicornis sp. nov.

Fig. 21

Records

SAM 34°S 17°E 800 m 2 ♀♀ (1 record)

Holotype

Female, in the South African Museum, SAM–A15739, collected by the SAM, in about 1900. Type locality: 800 m, off the Cape Peninsula (34°25′S 17°45′E). SAM station number SAM–A10602 (PF 17440).

Etymology

Bis (L)—twice; cornu (L)—a horn, referring to the two horns on the carapace.

Description

Female, holotype, length 8,5 mm. Integument lightly calcified, slightly brittle, smooth. Carapace (Fig. 21A) large, rounded, well arched dorsally, with a single pair of large pointed anterolateral horns visible in dorsal view (Fig. 21B) with several minute tubercles between them. Anterolateral angle wanting, ventrolateral edge spinose. Pseudorostrum moderately short and pointed. Eyelobe small, rounded and eyeless. Carapace nearly three times length of pereion; first somite obscured laterally by posterior protrusion of carapace, next two very narrow. Last three pedigerous and first three abdominal somites with a pair of short, sharp dorsolateral spines, second to fourth pedigerous somites also with a pair of lateral spines. Abdominal somites including telson slightly longer than cephalothorax, subcylindrical.

First segment of antenna 1 (Fig. 21C) slender, slightly shorter than next two together. Flagellum 3-segmented, rather short; accessory flagellum apparently 1-segmented.

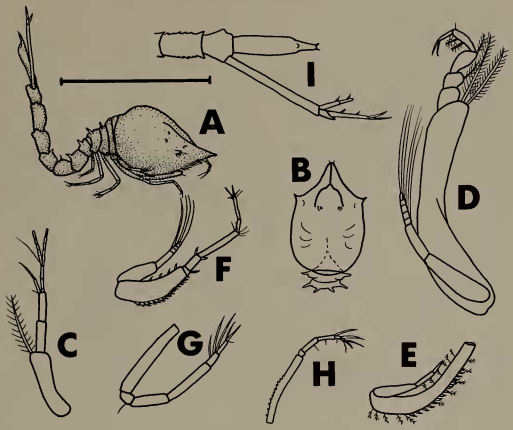

Fig. 21. *Makrokylindrus bicornis* sp. nov.
Female. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Maxilliped 3. E. Basis of pereiopod 1. F. Pereiopod 2. G. Pereiopod 3. H. Pereiopod 5. I. Uropod and telson.
Scale line = 4 mm for A–B; 2 mm for E–I; 1 mm for C–D.

Basis of maxilliped 3 (Fig. 21D) more than twice length of rest of limb, slightly widened distally. Ischium and merus short and stout; carpus very slightly expanded distally; last two segments subcylindrical.

Segments distal to basis of pereiopod 1 missing. Basis (Fig. 21E) curved with a row of sharp spines on lower edge. Exopod apparently 3-segmented. Basis of pereiopod 2 (Fig. 21F) fairly short, strongly spinose on lower edge, subequal in length to next three segments together. Carpus slender, slightly longer than next two segments together. Pereiopods 3 (Fig. 21G) and 4 similar, without exopods; basis of pereiopod 3 subequal in length to rest of limb. Basis of pereiopod 5 (Fig. 21H) rather longer than rest of limb, serrated on anterior edge.

Telson (Fig. 21I) slightly longer than last two abdominal somites together; post-anal part less than a third total length and narrower than pre-anal part with a single pair of terminal spines. Peduncle of uropod slightly longer than telson, apparently unarmed. First segment of endopod slightly longer than

second, third missing. Exopod half length of peduncle.

The *male* is unknown.

Length

Female 6,2–8,5 mm.

Remarks

M. bicornis is close to *M. inermis* in the large, smooth, unsculptured carapace, which in *M. inermis*, however, lacks lateral horns. *M. insignis* does possess these horns but in this species the reticulate patterning of the carapace is characteristic; also the peduncle of the uropod is much shorter and the telson is shorter, stouter terminally and possesses a pair of lateral spines.

Distribution

A single record from 800 m off the Cape Peninsula.

Makrokylindrus acanthodes (Stebbing, 1912)

Fig. 22

Adiastylis acanthodes Stebbing, 1912: 148–149, pl. 53.
Diastylis acanthodes Jones, 1969: 169.
Makrokylindrus acanthodes Băcescu, 1962: 222.

Records

SM	27°S 32°E–30°S 31°E	550–900 m	3 adult ♂♂, 21 subadult ♂♂, 2 immature ♂♂, 10 ovig. ♀♀, 27 ♀♀, 14 juvs (14 records)

Previous records

Holotype only.

Holotype

Adult male, deposited by Stebbing in the British Museum (Natural History). Type locality: 805 m, off Durban (about 30°S 30°E).

Description

Ovigerous female, length 7,4 mm (from SM 151 off Durban). Integument lightly calcified, reticulate, hairy; some hairs very fine, causing particles of debris to adhere and thus appearing floury. Carapace with many minute, curved spines and some larger nodules bearing long, slender delicate spines (usually lost or damaged). Carapace (Fig. 22A) fairly deep in midportion, inflated posterolaterally with a narrow depressed groove running around posterior edge. Anterolateral angle wanting, anterolateral edge with several very large spines. Pseudorostrum (Fig. 22B) fairly short and smoothly rounded; eyelobe small, triangular and eyeless.

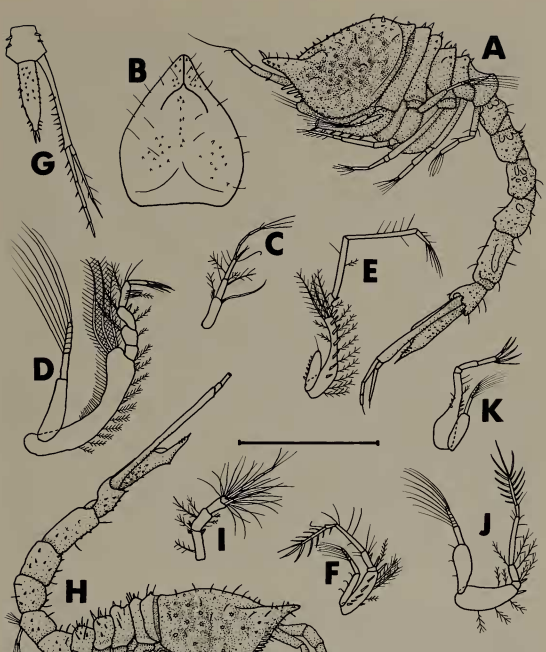

Fig. 22. *Makrokylindrus acanthodes.*

Ovigerous female. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1 of young female. F. Pereiopod 2. G. Uropod and telson. Adult male. H. Lateral view. I. Antenna 1. J. Pereiopod 2. K. Pereiopod 3. L. Telson and peduncle of uropod.

Scale line = 2 mm for A–B, H; 1 mm for C–G, I–L.

Pereion nearly as long as carapace; second to fourth somites slightly flanged laterally. Cephalothorax and abdomen (excluding telson) subequal in length, abdominal somites with few small spines and several patches of light discoloration.

Antenna 1 (Fig. 22C) rather large, first segment slightly larger than each of next two; flagellum 4-segmented and accessory flagellum 2-segmented.

Exopod of maxilliped 3 (Fig. 22D) large. Basis slightly longer than rest of limb and somewhat produced distally. Last three segments subcylindrical and subequal in length.

Pereiopod 1 damaged in all ovigerous females. In young female (Fig. 22E) very long, basis less than a third total length. Last three segments elongate; propodus as long as basis. Basis of pereiopod 2 (Fig. 22F) short, moderately narrow, less than a third total length of limb. Merus about three times length of ischium; carpus twice length of merus. Exopod moderately large. Pereiopods 3 and 4 without exopods; bases long and cylindrical, merus and carpus subequal in length. Basis of pereiopod 5 shorter than rest of limb.

Telsonic somite (Fig. 22G) slightly wider than long with two pairs of small spinules laterally. Telson twice length of telsonic somite, slightly shorter than last two abdominal somites together; pre-anal part less than twice length of post-anal part, with numerous spinules dorsally and laterally on basal part. Post-anal part tapering evenly, with three pairs of lateral and a much longer pair of terminal spines. Peduncle of uropod a quarter as long again as telson, slender, with several fine spines on inner edge. Endopod longer by one segment than exopod, 3-segmented; each segment slightly longer than succeeding one. Exopod very slender.

Adult male, length 7,8 mm (SM 151). As female, except as follows: carapace (Fig. 22H) shallower, spinose nodules less elevated. Teeth at anterolateral edge originating slightly behind margin. First four pedigerous somites much shallower, second to fourth strongly flanged laterally; pereion somites slightly more hairy and spinules longer. Abdominal somites without patches of discoloration.

Antenna 1 (Fig. 22I) stouter, third segment bearing numerous sensory setae; accessory flagellum longer. Antenna 2 short, hardly reaching beyond end of thorax. Distal segments of pereiopod 1 missing from all adult males. Basis of pereiopod 2 (Fig. 22J) larger and not spinose; exopod larger. Bases of pereiopods 3 (Fig. 22K) and 4 stouter, exopods present.

Telson (Fig. 22L) shorter relative to elongate peduncle of uropod with a short raised keel surrounding depressed middorsal area. Pre-anal part relatively shorter. Peduncle of uropod apparently unarmed, rami missing from all specimens.

Length

Adult male	7,1–7,8 mm
Ovigerous female	7,4–8,5 mm

Remarks

M. acanthodes was described by Stebbing (1912) on the basis of a single adult male from South Africa placed in the new genus *Adiastylis* (see page 221). The present specimens differ from Stebbing's figures in minor respects only. The spines on the entire body are more marked in his figures, but these spines are extremely delicate and are usually lost. The lateral spines of the telson are spaced more widely and the peduncle of the uropod bears numerous rather long setae in his figure.

M. aegaeus Reyss, 1974*b*, is closest to *M. acanthodes* in general appearance, differing in the size and arrangement of spination on the body, the proportions of pereiopods 1 and 2, the lateral spination of the telson and the proportions of the rami of the uropods.

Distribution

Known only from the coast of Natal near Durban at depths from 550 to 900 m.

Makrokylindrus aculeatus sp. nov.

Fig. 23

Records

SAM 34°S 17°E 800 m 1 subadult ♂, 1 ♀, 1 juv. (1 record)

Holotype

Female, in the South African Museum, SAM–A15741, collected by the SAM, in about 1900. Type locality: 800 m, off the Cape Peninsula (34°25′S 17°45′E). SAM station number SAM–A10602 (PF 17440).

Etymology

Aculeatus (L)—provided with prickles or stings, referring to the spinose exoskeleton.

Description

Female, holotype, length 8,8 mm. Integument lightly calcified, fairly brittle; carapace densely covered with short pointed spines; pedigerous and anterior abdominal somites with a few spinules, posterior abdominal somites smooth and reticulate. Carapace (Fig. 23A) large, twice as long as wide, gently arched and slightly inflated posteriorly. No antennal notch; anterolateral edge with very slightly longer spines than elsewhere. Pseudorostrum rather sharp in lateral view, rounded anteriorly in dorsal view (Fig. 23B) with fewer spinules. (Most spinules omitted in Fig. 23B.) Eyelobe small, triangular and eyeless.

Pereion less than half length of carapace, first two somites poorly spinose and last three with pairs of rather large, erect spines dorsally. Abdomen hardly longer than carapace; somites cylindrical, first two with a pair of large spines dorsolaterally.

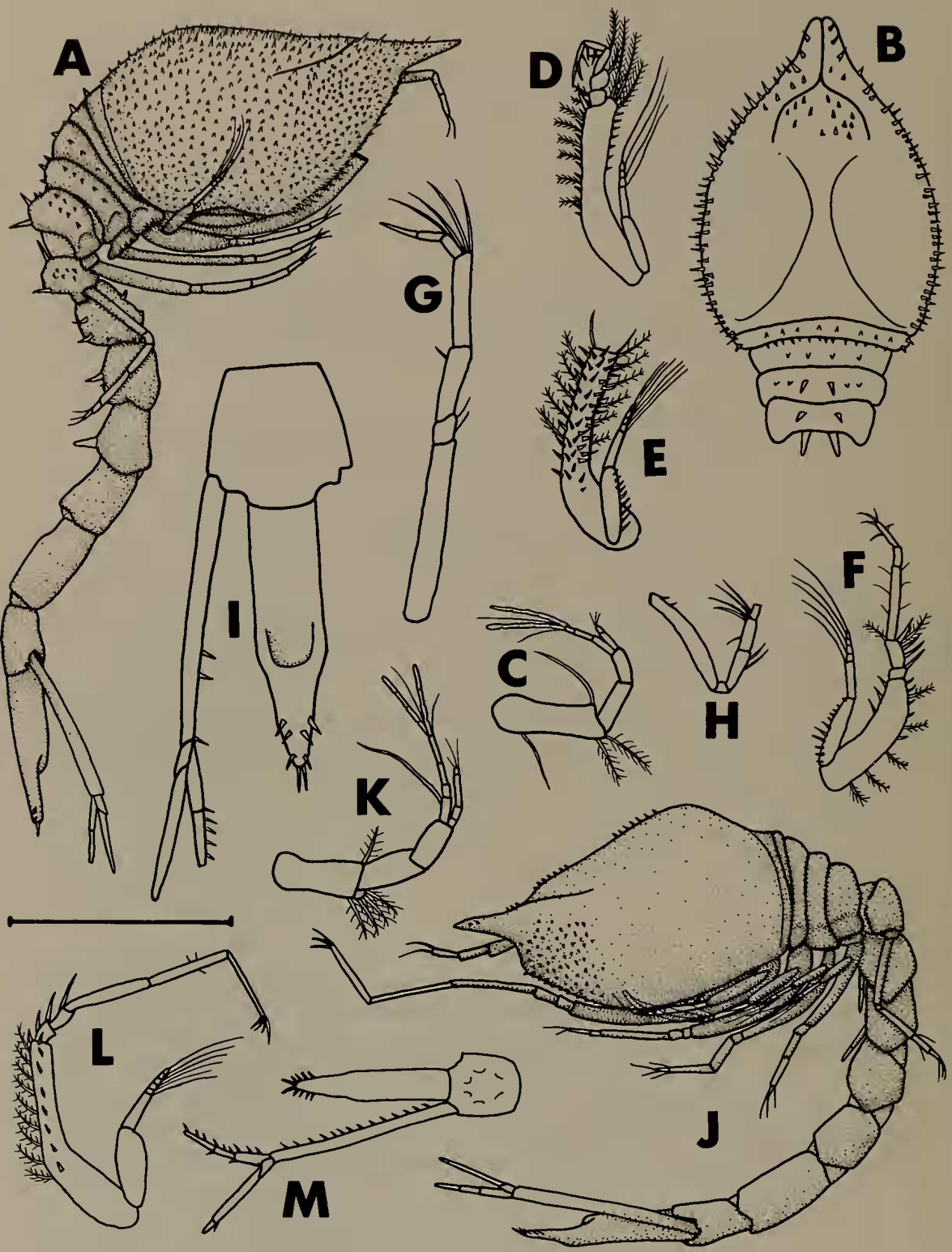

Fig. 23. *Makrokylindrus aculeatus* sp. nov.

Female. A. Lateral view. B. Dorsal view of carapace (most spines omitted). C. Antenna 1 D. Maxilliped 3. E. Basis of pereiopod 1. F. Pereiopod 2. G. Pereiopod 3. H. Pereiopod 5 I. Uropod and telson.

Subadult male. J. Lateral view. K. Antenna 1. L. Pereiopod 1. M. Uropod and telson. Scale line = 2 mm for A–B, J, M; 1 mm for C–I, K–L.

Antenna 1 (Fig. 23C) rather small, first segment longer than and twice as wide as next two together. Flagellum 3-segmented and accessory flagellum 2-segmented.

Basis of maxilliped 3 (Fig. 23D) twice length of rest of limb, uniformly wide along entire length; merus short and very slightly expanded; last three segments cylindrical. Exopod fairly small.

Segments distal to basis of pereiopod 1 missing. Basis (Fig. 23E) strongly spinose. Basis of pereiopod 2 (Fig. 23F) subequal in length to next four segments together, moderately wide. Carpus longer than propodus and dactyl together. Pereiopod 3 (Fig. 23G) longer than pereiopod 2, shorter than pereiopod 4 with basis less than half total length of limb. Pereiopods 4 and 5 (Fig. 23H) similar to pereiopod 3. Dactyl of pereiopod 5 missing. Pereiopods 3 and 4 without exopods.

Telsonic somite (Fig. 23I) as long as wide, less than half length of telson. Telson stout, more than a quarter as wide as long at base; pre-anal part cylindrical and little longer than post-anal part, slightly depressed middorsally above anal valves. Post-anal part with three pairs of lateral spines, all situated rather more dorsally than usual. Terminal spines slender. Peduncle of uropod slender, shorter than telson and subequal in length to last two abdominal somites together with two spines on inner edge (rest probably lost). Exopod fairly short and stout; endopod represented by first two segments only, third apparently mutilated; first slightly longer than remainder of second.

Subadult male, paratype, length 9,2 mm. As female except as follows: integument very brittle: individual apparently in pre-moult condition with parts of carapace having lost outer, spinose integument and being soft and smooth underneath. Integument where whole with finer, shorter spinules. Carapace (Fig. 23J) slightly more vaulted posterodorsally and nearly twice as long as wide. Pereion and pleon entirely without spinules.

First segment of antenna 1 (Fig. 23K) shorter, second and third wider; both flagella 4-segmented. Basis of pereiopod 1 (Fig. 23L) subequal in length to next four segments together with a single row of rather small spines; ischium and merus small and subequal in length; carpus and propodus slender and subequal in length, each slightly longer than dactyl.

Telsonic somite (Fig. 23M) slightly depressed middorsally, slightly less than half length of telson. Pre-anal part of telson slightly longer with no middorsal depression; distal tip of telson with four pairs of lateral spines. Peduncle of uropod slender, as long as last two and a half abdominal somites together, slightly longer than telson and armed with about 14 small spines on inner edge. Endopod 3-segmented, half length of peduncle; second segment slightly shorter than first or third. Endopod very slightly longer than exopod with a stout terminal spine.

Length

Subadult male 9,2 mm Female 8,8 mm

Remarks

It is not certain that the female and male described above belong to the same species. In general appearance and structure of most of the limbs they are very similar but the uropods and telson differ rather more than is usual in the genus. Finality on the matter will have to await the collection of more material

M. aculeatus is close to *M. mystacinus*, *M. wolffi* and *M. lomakinae*. *M. mystacinus*, however, has a flattened keel anterolaterally around the carapace and the telson bears only one or two pairs of lateral spines. The pre-anal part of the telson is much longer and more slender in *M. wolffi*, the post-anal part bears no lateral spines and the first segment of the first antenna is relatively much larger. In *M. lomakinae* the basis of pereiopod 1 is longer relative to the rest of the limb, the telson is much narrower distally and the endopod of the uropod is 2-segmented.

Distribution

Known from a single sample from 800 m off the Cape Peninsula.

Diastylis Say, 1818

Generic diagnosis

Pseudorostrum less than a third total length of carapace. Third and fourth pedigerous somites not coalesced, fifth usually produced posteriorly. Antenna 1 of moderate size. Basis of pereiopods not widened in male and pereiopods 2 and 3 not widely separated in ovigerous female. Pereiopods 3 and 4 with exopods rudimentary or absent in female. Male with two pairs of pleopods. Post-anal part of telson longer and more slender than pre-anal part with at least three (usually more than five or six) pairs of lateral and one pair of terminal spines. Endopod of uropod 2- or 3-segmented.

Type species

D. rathkei (Kröyer, 1841) (as *Cuma rathkei*) replacing *D. arenarius* Say, 1818 (nomen nudum) (see page 221).

Remarks

The *Diastylis–Makrokylindrus* group of species is discussed in detail on page 221. There are about seventy species in the genus *Diastylis*, but this number is approximate because many species have been described inadequately or from poor material.

Distribution

The genus is cosmopolitan and the depth ranges are rather wider than is usual in the order. Several species, particularly from the northern hemisphere, are known from depths of less than 20 to more than 1 000 m.

Only species from the southern hemisphere are included in the key below. Since many species are strongly sexually dimorphic, it has sometimes been necessary to key out males and females separately. Where the sex is not stated the characters apply equally to male and female. No attempt has been made to join apparently synonymous species.

KEY TO THE SPECIES OF *DIASTYLIS* FROM THE SOUTHERN HEMISPHERE

1 Abdomen including telson twice length of cephalothorax
♀ *D. tenuicaudus* Lomakina, 1967—Tasman Sea
– Abdomen including telson about as long as cephalothorax 2
2 Carapace smooth with three pairs of horns anteriorly below eyelobe
♀ *D. hexaceros* Zimmer, 1908—South Africa
– Carapace smooth, ridged or spinose but without horns 3
3 Peduncle of uropod extending beyond tip of telson (excluding terminal spines) for a quarter its length or more 4
– Peduncle of uropod extending posteriorly about as far as telson 11
4 Carapace with no ridges or rows of spines 5
– Carapace with at least one pair of oblique or transverse ridges or rows of spines .. 7
5 Telson as long as last three abdominal somites together, post-anal part shorter than pre-anal part with four pairs of lateral spines
♀ *D. exilicaudus* Jones, 1969—Great Australian Bight
– Telson hardly longer than telsonic somite, post-anal part longer than pre-anal part with no more than three pairs of lateral spines 6
6 Basis and following three segments of maxilliped 3 widened distally with one or more teeth; ischium, merus and carpus of pereiopod 2 together longer than propodus and dactyl together; female with antennal notch and male without
D. pseudinornatus Ledoyer, 1977—Antarctic
– Basis and following three segments of maxilliped 3 not widened distally nor bearing teeth; ischium, merus and carpus of pereiopod 2 together shorter than propodus and dactyl together; antennal notch absent in female, male unknown
♀ *D. inornatus* Hale, 1937*b*—Antarctic
7 Carapace with ten to twelve oblique ridges on either side
D. anderssoni Zimmer, 1907—Antarctic
– Carapace with no more than five transverse or oblique ridges on either side; ornamentation of carapace variable 8
8 Carapace with sharp, very oblique ridge(s) delineating depressed anterodorsal area 9
– Carapace with no depressed area; ridge(s) transverse 10
9 Telson no longer than telsonic somite with twelve pairs of lateral spines; telson plus telsonic somite together equal in length to peduncle of uropod
♀ *D. hammoniae* Zimmer, 1902—south-west Atlantic
– Telson nearly half as long again as telsonic somite with about five pairs of lateral spines; telson plus telsonic somite together about a quarter as long again as peduncle of uropod ♀ *D. planifrons* Calman, 1912—south-west Atlantic
10 Sides of carapace with three oblique ridges and no spines
D. neozealanicus Thomson, 1892—New Zealand
– Sides of carapace with an oblique row of spines; rest of carapace covered with spinules in female and smooth in male *D. insularum* (Calman, 1908)—New Zealand
11 Endopod of uropod 2-segmented 12
Endopod of uropod 3-segmented 18
12 Carapace with some large spines interspersed among numerous smaller spinules
D. horridus Sars, 1887—Antarctic
– Carapace smooth or covered with spines or spinules of uniform length 13
13 Anterior part of carapace uniformly covered with spinules
D. zimmeri Ledoyer, 1977—Antarctic
– Spinules in rows on carapace if present at all 14
14 Female, juvenile or young male 15

– Adult male 17
15 Telson subequal in length to peduncle of uropods with three pairs of lateral spines; peduncle with spines on inner edge 16
– Telson slightly shorter than peduncle of uropod with five to six pairs of lateral spines; peduncle unarmed .. .. ♀ *D. argentatus* Calman, 1912—Chile
16 Carapace with a row of tubercles around entire border, one obliquely above antero-lateral edge and three on sides ♀ *D. granulatus* Zimmer, 1921—south-west Atlantic
– Carapace without these rows of tubercles ♀ *D. fimbriatus* Sars, 1873—south-west Atlantic
17 Pseudorostrum with a longitudinal row of spinules; posterior tooth of fifth pedigerous somite bifid .. .. ♂ *D. argentatus* Calman, 1912—Chile
– Pseudorostrum without spinules; posterior tooth of fifth pedigerous somite with a single point .. .. ♂ *D. fimbriatus* Sars, 1873—south-west Atlantic
18 Carapace with two rows of large, curved spines laterally subadult ♂ *D. corniculatus* Hale, 1937*b*—Antarctic
– Carapace without rows of large, curved spines 19
19 Telson shorter than last one and a half abdominal somites together 20
– Telson almost, or as long as last two abdominal somites together 22
20 Carapace devoid of denticles but with coarse, shallow pits; basis of maxilliped 3 expanded distally and twice width of ischium ♀ *D. delicatus* Jones, 1969—Tasman Sea
– Carapace with scattered denticles anteriorly at least; basis of maxilliped 3 not or hardly expanded distally and no more than half as wide again as ischium 21
21 Numerous spinules on carapace; anterolateral edge with two or three small teeth; telson abruptly narrower posteriorly with eight to nine pairs of lateral spines ♀ *D. acuminatus* Jones, 1960*b*—Chatham Islands
– A few spinules anteriorly on carapace; anterolateral edge strongly dentate; telson tapering posteriorly with no more than six pairs of lateral spines *D. namibiae* sp. nov.
22 Fifth pedigerous somite produced to a point in both sexes; pre-anal part of telson distinctly shorter than post-anal part *D. algoae* Zimmer, 1908—South and South West Africa
– Fifth pedigerous somite not produced to a point in female and hardly so in young male (adult male unknown); pre-anal part of telson almost as long as post-anal part 23
23 Carapace without ridges or denticles; rami of uropod subequal in length to peduncle; second to fourth pleon somites with a middorsal spine, fifth with a row of spines on each side .. .. ♀ *D. gibbera* Jones, 1969—Great Australian Bight
– Carapace with ridges or denticles; rami of uropod about half length of peduncle; pleon somite lacking spines 24
24 Carapace and pleon with several oblique ridges; telson with four pairs of lateral spines ♀ *D. mawsoni* Calman, 1918—Antarctic
– Carapace and pleon without ridges; telson with about seven pairs of lateral spines *D. denticulatus* Jones, 1956—South West Africa

Diastylis algoae Zimmer, 1908

Figs 24–25

Diastylis algoae Zimmer, 1908: 188–189, pls 9–10; Stebbing, 1910: 418; Stebbing, 1912: 147–148; Jones, 1960*a*: 178.
Diastylis rufescens Jones, 1955: 288–290, figs 6–7.

Records

			adult ♂	sub-adult ♂	♂	ovig. ♀	♀	juv.	total	no. of records
SWD	26°S 15°E	26 m	5	22	15	15	61	38	156	1
WCD	32°S 17°E–34°S 18°E	20–172 m	95	208	185	339	660	259	1746	28
LBT	32°S 18°E	40–100 m		4	6	7	10	1	28	5

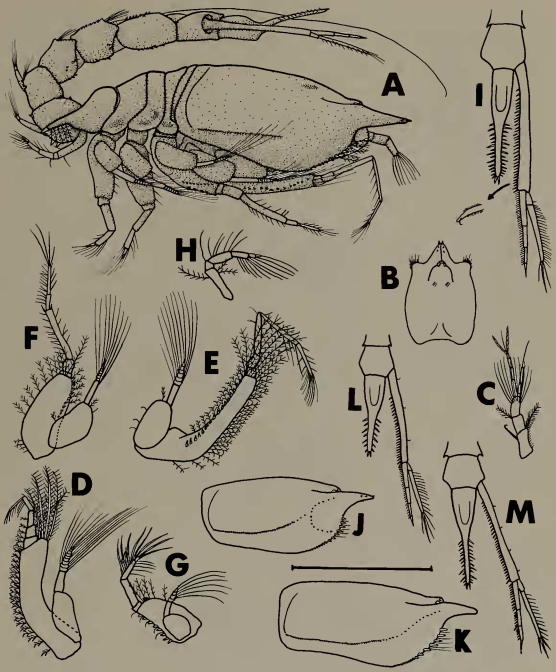

Fig. 24. *Diastylis algoae.*

Adult male. FAL: A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Pereiopod 3. H. Pereiopod 5. I. Uropod and telson. WCD: J. Lateral view of carapace. L. Uropod and telson. SWD: K. Lateral view of carapace. M. Uropod and telson.

Scale line = 4 mm for B; 2 mm for A, C–M.

			adult ♂	sub-adult ♂	♂	ovig. ♀	♀	juv.	total	no. of records
SB	33°S 17°E	11– 56 m	14	26	6	45	89		180	10
FAL & FBY	34°S 18°E	27–102 m	34	44	20	76	56	41	271	57
SCD	34°S 21°E–33°S 25°E	32–172 m	8	19	9	15	46	12	109	21
SST	34°S 21°E–35°S 22°E	30–200 m	7		10	57	50	63	216	9
SAM	34°S 18°E–33°S 25°E	37–110 m	2	1		2	5		10	6
FISH		plankton				2	8	13	23	4

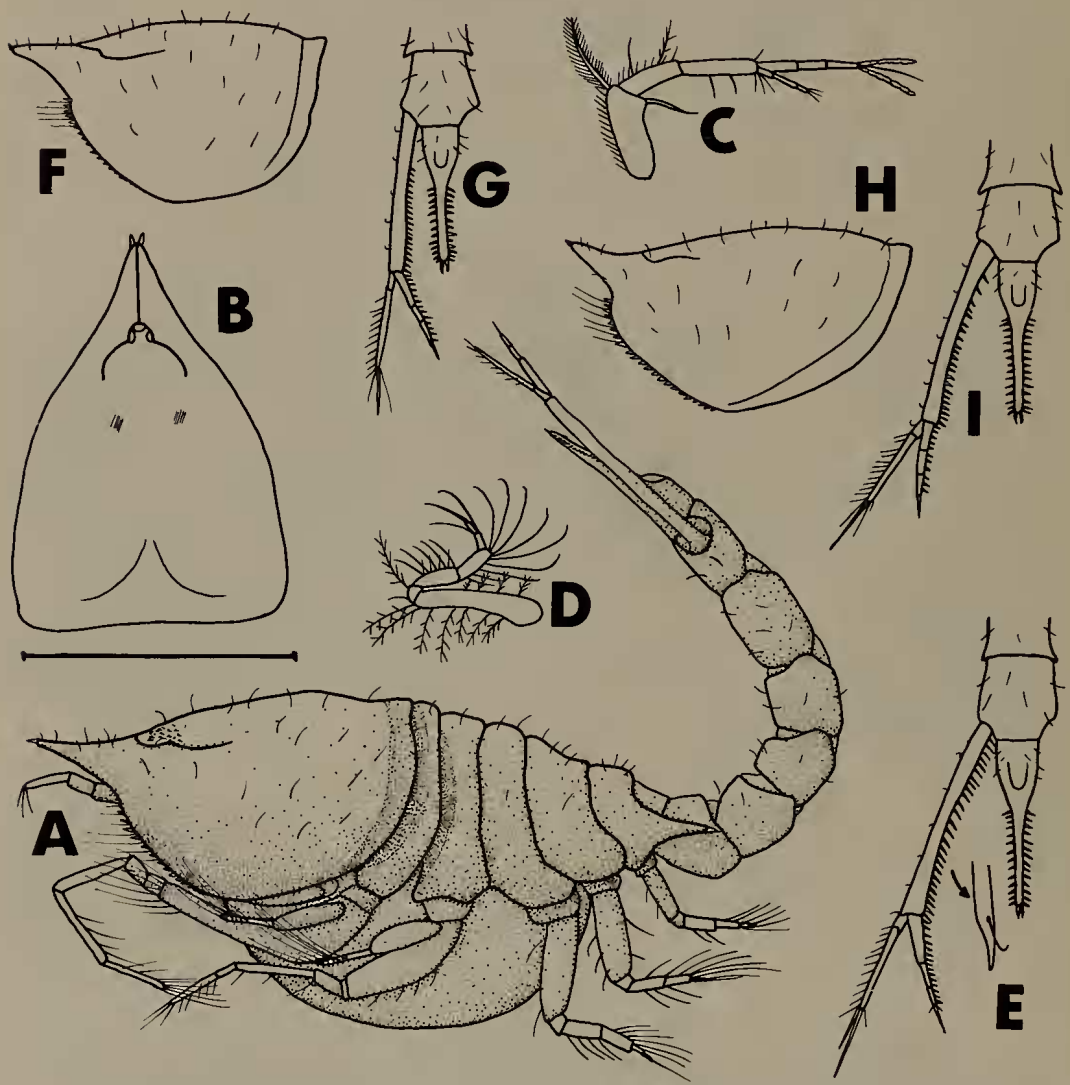

Fig. 25. *Diastylis algoae*.

Ovigerous female. FAL: A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Pereiopod 3. E. Uropod and telson. WCD: F. Carapace in lateral view. G. Uropod and telson. SWD: H. Carapace in lateral view. I. Uropod and telson.

Scale line = 2 mm for A–B, D–I; 1 mm for C.

Syntypes

Two females, at least one ovigerous, deposited by Zimmer in the Berlin Zoologisches Museum. Type locality: 40 m, in Algoa Bay (Port Elizabeth) (33°S 25°E).

Previous records

Algoa Bay (33°S 25°E)—40 m (Zimmer 1908); Still Bay (34°S 20°E)—44 m, Algoa Bay 51–57 m, East London (32°S 28°E)—75 m (Stebbing 1910, 1912); Orange River Mouth (28°S 16°E)—plankton (Jones 1955); Lambert's Bay (32°S 18°E)—plankton, False Bay (34°S 18°E)—82 m (Jones 1960*a*).

Description

Adult male, length 10,6 mm (FBY 51G). Integument reticulate and covered with minute spinules. Carapace (Fig. 24A) two and a half times as long as deep, slightly arched dorsally with a pair of shallow depressions posterolaterally on the frontal lobe and a line of small spinules ventrolaterally on the posterior half. Pseudorostrum straight and pointed, about a fifth total length of carapace with a few slightly larger spinules and one fairly obvious apical pair. Anterolateral edge finely dentate and bearing several plumose setae; antennal notch fairly deep, anterolateral angle wanting. In dorsal view (Fig. 24B) anterolateral corners widely bowed outwards and denticles visible. Eyelobe rounded, slightly wider than long with three indistinct lenses.

Pereion including posterior projection of fifth pedigerous somite about half length of carapace. First pedigerous somite very narrow and obscured laterally by carapace; second to fourth flanged laterally; posterior projection of fifth very long, slightly curved, with a large terminal spine. Abdomen (excluding telson) subequal in length to carapace; first abdominal somite with two pairs of small ventral spines; second almost smooth. Third to fifth with scattered denticles plus two rows of small sharp denticles dorsolaterally and two ventrolaterally; second to fourth with brushes of setae posteroventrally. All abdominal somites deeply grooved ventrally to accommodate flagellum of second antenna.

First segment of antenna 1 (Fig. 24C) slightly longer than next two subequal segments together; third segment twice as long as broad with many sensory setae. Flagellum 4-segmented and accessory flagellum 3-segmented. Flagellum of antenna 2 reaching well beyond distal tip of uropods, segments long.

Basis of maxilliped 3 (Fig. 24D) stout, little produced distally and slightly less than twice as long as remainder of limb. Exopod large.

Basis of pereiopod 1 (Fig. 24E) subequal in length to rest of limb; wide proximally and strongly setose with a row of spines on outer surface; exopod very large. Ischium and merus short, together half length of carpus; carpus slightly longer than dactyl and slightly shorter than propodus. Basis of pereiopod 2 (Fig. 24F) subequal in length to next four segments together, fairly wide

and setose with a row of spines on outer surface. Ischium very short; carpus slightly longer than propodus and dactyl together. Exopod very large. Pereiopods 3 (Fig. 24G) and 4 similar; basis wide, exopod large, merus and carpus long. Pereiopod 5 (Fig. 24H) rather small. Distal three segments of last three pereiopods bearing numerous fossorial setae.

Telsonic somite (Fig. 24I) as wide as long, less than half length of telson. Telson as long as last two and a half abdominal somites together, pre-anal part about two-fifths total length with a depressed middorsal region bounded by a sharp keel. Post-anal part with 15 (varies between 12 and 20) pairs of short, sharp lateral spines. Peduncle of uropod slightly longer than telson, strongly spinose on inner margin. Endopod slightly longer than exopod, less than half length of peduncle and 3-segmented. First segment subequal in length to next two together.

Adult male, length 8,6 mm (WCD 69F). As male from False Bay except: carapace (Fig. 24J) slightly more than twice as long as deep. eyelobe slightly protruding dorsally. Lateral line of spinules bending slightly upwards and joining faint semicircular ridge running backwards from base of eyelobe and turning forwards to anterolateral corner. Frontolateral edge deeper with shorter, non-plumose setae. Telsonic somite (Fig. 24L) slightly wider than long; telson slightly shorter, pre-anal part relatively longer, post-anal part with seven (varies between six and nine) pairs of lateral spines.

Adult male, length 7,8 mm (SWD 16E). As FAL and WCD males except: carapace (Fig. 24K) more than two and a half times as long as deep, laterally without semicircular ridge anterolaterally; frontolateral teeth slightly larger, not interspersed with setae. Telsonic somite (Fig. 24M) slightly less than three times length of telson; proportions of pre- and post-anal parts of telson intermediate between those of FAL and WCD specimens with 12 (varies between 10 and 13 pairs) of lateral spines. Telson subequal in length to peduncle of uropod.

Ovigerous female, length 9,6 mm (FBY 51G). As adult male from FAL except as follows: integument with short, scattered hairs; spinules more evident on eyelobe; eye visible only as gaps between spinules. Carapace (Fig. 25A) twice as long as deep, without lateral line of spinules. Pseudorostrum nearly a quarter total length of carapace, slightly upturned; apical teeth very distinct, but no other large ones evident. Teeth at anterolateral edge much smaller; no plumose setae present. Carapace in dorsal view (Fig. 25B) wider posteriorly than anteriorly; anterolateral corners not produced or visible.

Carapace almost as long as pereion; first pedigerous somite wider and all without obvious lateral flanges; posterior projection of fifth shorter. Abdominal somites subcylindrical and without spinules, together equal in length to carapace and first two pedigerous somites only.

All segments of antenna 1 (Fig. 25C) longer and more slender; both flagella 3-segmented. Antenna 2 short. Bases and exopods of pereiopods 1 and 2 smaller. Pereiopods 3 (Fig. 25D) and 4 similar, without exopods; bases very

much more slender.

Telson twice length of telsonic somite (Fig. 25E) with 14 (varies between 11 and 17 pairs) of lateral spines; pre-anal part relatively shorter, middorsal depressed area shallower and less evident. Endopod of uropod half length of peduncle and slightly shorter than exopod.

Ovigerous female, length 7,8 mm (WCD 69F). As FAL ovigerous female except: carapace (Fig. 25F) less than twice as long as deep, frontal edge deeper with setae between the spines. Posterior groove quite distinct. Pre-anal part of telson (Fig. 25G) shorter, post-anal part with 13 (varies between 11 and 16) pairs of lateral spines. Third segment of endopod slightly longer than second.

Ovigerous female, length 7,5 mm (SWD 16E). As ovigerous females from FAL and WCD except: pseudorostrum (Fig. 25H) slightly shorter and more upturned; posterior depression running further forward along ventral edge. Anterolateral teeth extending further back with setae interspersed between the spines. Post-anal part of telson (Fig. 25I) with fifteen (varies between thirteen and sixteen) pairs of lateral spines. Endopod of uropod less than half length of peduncle, all three segments subequal in length.

Length

Adult male: SWD forms 7,4–8,3 mm; WCD forms 8,0–10,8 mm; FAL forms 8,0–10,6 mm; SCD forms 7,7–9,3 mm.

Ovigerous female: SWD forms 6,7–8,6 mm; WCD forms 7,0–10,6 mm; FAL forms 6,7–9,6 mm; SCD forms 6,7–9,0 mm.

Remarks

Two species of *Diastylis*, *D. algoae* and *D. rufescens* Jones, 1955 have been described from southern African waters. *D. algoae* was described from two ovigerous females from Algoa Bay on the south coast and *D. rufescens* from adult males and females from plankton samples taken off the Orange River Mouth. Comparison of the original figures of the females of the two species suggests that they are very easily distinguished, particularly in the relative lengths of the carapace and the whole body, the distal segments of pereiopod 1 and the endopod of the uropod. However, on examination of hundreds of specimens of *Diastylis* available in the present collection, taken from Lüderitz to East London, it has become apparent that there are not only specimens approaching both *D. algoae* and *D. rufescens* but that there is a range of intermediates, which appear to form a single highly variable species. The length of the carapace in proportion to the depth varies from less than two to almost three; the anterolateral region of the carapace is shallow in some and deep in others; the proportions of the pre and post-anal parts of the telson vary, as do the number of pairs of lateral spines and the relative length of the telson and uropods. The lengths of the animals are also variable.

In short, it is apparently impossible to distinguish two species, particularly since variable characters are not always found together in the same group of

individuals or those from a part of the geographic range. There is a tendency for those animals from the north-west to be most elongate and for those from the east to be rather short and stout; otherwise the variability is not constant. Thus it is proposed to place all of the specimens in a single species. Since Zimmer's is the older name, the species must be called *D. algoae*, with *D. rufescens* becoming a synonym.

One of the major characters used by Jones to distinguish his species from *D. algoae* was the anterior emargination of the pseudorostrum in the female of this species. In fact this 'emargination' shown by Zimmer is a poor representation of the pair of apical spines which is present in most specimens of both sexes, but which may be absent. The absence sometimes appears to be due to mutilation but in other cases there is no sign that the spines were ever present. The three distal segments of pereiopod 1 appear to be shorter in *D. rufescens* than in any of the specimens seen by the author, but this single character is not sufficient to warrant the separation of the species.

Within *Diastylis*, *D. algoae* appears to be most similar to *D. laevis* Norman, 1869, which however differs in the presence, in the male, of oblique folds on the carapace and the longer telson in both sexes. Of the species from the southern hemisphere, *D. denticulatus* is closest to *D. algoae* but is distinguished by the longer pre-anal part of the telson, the vertical rows of spinules on the carapace and the shorter posterior protrusion of the fifth pedigerous somite. The adult male of *D. denticulatus* is unknown.

Distribution

As well as being highly variable morphologically, *D. algoae* is one of the most widely distributed southern African Cumacea. It is known from Lüderitz to East London at depths from 20 to 200 m and is the most abundant species on the coast.

Diastylis namibiae sp. nov.

Fig. 26

Records

			sub-adult ♂	♂	ovig. ♀	♀	total	no. of records
SWD	26°S 15°E	26 m		2	1		3	1
WCD	32–33°S 17°E	78–142 m	1	1		1	3	2
LBT	32°S 17°E	200–280 m		1		2	3	2

Holotype

Adult female, in the South African Museum, SAM–A15740, collected by UCT, 15 September 1970. Type locality: 280 m, off Lambert's Bay (32°05′S 17°00′E). UCT station number LBT 24K.

Etymology

This species is named for the Namib desert, off the coast of which it is found.

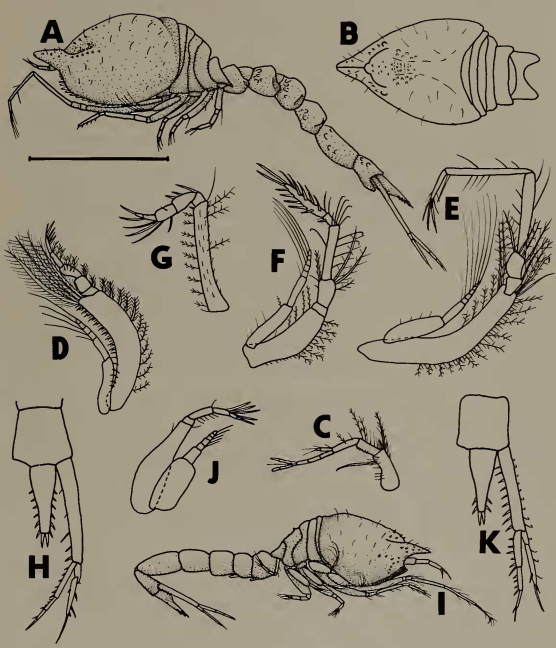

Fig. 26. *Diastylis namibiae* sp. nov.
Adult female. A. Lateral view. B. Dorsal view of cephalothorax. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Pereiopod 3. H. Uropod and telson.
Subadult male. I. Lateral view. J. Pereiopod 3. K. Uropod and telson.
Scale line = 2 mm for A–B, I; 1 mm for C–H, J–K.

Description

Adult female, holotype, length 6,4 mm. Carapace (Fig. 26A) rather large, less than twice as long as deep and slightly wider than deep. Integument yellowish, well calcified, reticulate with a few small hairs and scattered spinules. Pseudorostrum short, fairly deep. Anterolateral angle waiting, frontolateral edge deep; this and anterolateral edge bearing numerous blunt, forward-pointing teeth. Eyelobe (Fig. 26B) wider than long, eyeless, with a few scattered spinules on it and on frontal lobe. Lateral to frontal suture is a row of about six small spinules running longitudinally, ending in a pair of short protuberances at posterior edge of frontal suture.

Pereion less than half length of carapace, first segment obscured laterally, fifth abruptly lower than fourth and slightly protruding posteriorly with a small spine at tip. Cephalothorax slightly shorter than abdomen; abdominal somites narrower anteriorly, subcylindrical posteriorly, last five with several small, clear patches.

Appendages taken from *ovigerous female*. Antenna 1 moderately large (Fig. 26C), first segment longer than each of next two subequal segments. Flagellum quite stout and 3-segmented; accessory flagellum short and 2-segmented.

Basis of maxilliped 3 (Fig. 26D) stout, slightly produced distally. Exopod narrow. Ischium short, as wide as merus. Last three segments narrow and longer.

Basis of pereiopod 1 (Fig. 26E) subequal in length to carpus and propodus together. Ischium and merus short; carpus and propodus long, fairly stout and subequal in length; dactyl short. Basis of pereiopod 2 (Fig. 26F) short, little more than half length of rest of limb. Ischium short; merus twice length of ischium; carpus long and subequal in length to dactyl. Pereiopods 3 (Fig. 26G) and 5 similar, without exopods. Bases with numerous fine spines as well as setae. Distal segments stout, merus and carpus subequal in length.

Telsonic somite (Fig. 26H) about as long as wide, slightly shorter than telson. Telson little narrower posteriorly than anteriorly, post-anal part longer than pre-anal with six pairs of lateral spines and a pair of larger terminal ones. Peduncle of uropod a third as long again as telson with few spines on inner edge. Rami rather slender; endopod 3-segmented, longer than exopod and two-thirds length of peduncle; first segment of endopod subequal in length to next two subequal segments together.

Subadult male, length 4,8 mm (WCD). As female, except as follows: pseudorostrum (Fig. 26I) shallower and more pointed; anterolateral angle evident; antennal notch present; anterolateral edge with longer, more numerous pointed spines. Anterior part of carapace with more and slightly longer spinules. Abdomen slightly longer than cephalothorax, somites cylindrical.

Second and third basal segments of antenna 1 stouter, flagellum 4-segmented. Carpus and merus of pereiopod 1 slightly shorter and propodus a little longer. Carpus of pereiopod 2 slightly shorter. Bases of pereiopods 3

(Fig. 26J) and 4 slightly stouter, exopods well developed; distal segments much more slender. Telson (Fig. 26K) with two pairs of spines.

Length

Subadult male 4,8 mm
Ovigerous female 5,4 mm

Remarks

This is one of the species which is accommodated in *Diastylis* without being typical of the genus. It is rather stouter than is usual and the telson approaches that of *Leptostylis*. However, it is nearer to *Diastylis* and is therefore placed in this genus in the absence of adult males which would confirm the generic position. In the short length of the telson it is most similar to *D. insularus* Calman, 1908, and *D. neozeaylanicus* Thomson, 1892, from New Zealand, differing from these in the shorter peduncle of the uropod, the shorter carapace and the stouter body as well as the arrangement of the spinules.

Distribution

Known only from the south-western coast of Africa from Lüderitz to Saldanha Bay at depths from 26 to 280 m.

Diastylis hexaceros Zimmer, 1908

Diastylis hexaceros Zimmer, 1908: 187, figs 93–95; Stebbing, 1913: 137.

Previous records

Type locality only.

Holotype

Ovigerous female, deposited by Zimmer in the Berlin Zoologisches Museum. Type locality: 565 m, on the Agulhas Bank (39°09′S 18°32′E).

Remarks

This species is known only from the holotype. It seems to be close to *Makrokylindrus bicornis* sp. nov., but possesses three pairs of lateral horns on the carapace rather than one. From Zimmer's figures the telson appears to be typical of *Diastylis*, but confirmation of the generic position will have to await the availability of more material.

Leptostylis Sars, 1869

Generic diagnosis

Pseudorostrum short and body slender. Fifth pedigerous somite not produced posteriorly. Third segment of antenna 1 of adult male large, clubbed and setose, quite different from that of adult female. Flagellum of antenna 2 of adult male not reaching beyond end of thorax. Rudimentary exopods usually

present on pereiopods 3 and 4 of female. Male with two pairs of pleopods. Telson usually shorter than and never more than a quarter as long again as telsonic somite with no more than four pairs of lateral spines. Uropods elongate, peduncle longer than telson and endopod 3-segmented.

Type species

Not designated. When erecting the genus, Sars (1869) included *L. ampullaceous* (Liljeborg, 1855), *L. longimanus* (Sars, 1865), *L. villosus* and *L. macrurus*.

Remarks

The genus is discussed in the remarks on the family on page 220 above. The slender form, short telson and large clubbed first antenna in adult males make it one of the more easily recognized of the *Diastylis* group of genera. Some species are close to *Diastylis* in the length of the telson; finality on the generic position of these species is possible only when adult males are available.

KEY TO THE SPECIES OF *LEPTOSTYLIS* FROM THE SOUTHERN HEMISPHERE

1 Carapace with crenulate, dentate or smooth dorsolateral, lateral or ventrolateral carina .. 2
– Carapace with no lateral carinae .. 5
2 Carina ventrolateral and crenulate *L. macruroides* Stebbing, 1912—South Africa
– Carina dorsolateral .. 3
3 Telson less than a third length of peduncle of uropod; lateral carina smooth *L. antipus* Zimmer, 1909—Antarctic
– Telson more than half length of peduncle of uropod; lateral carina dentate .. 4
4 Peduncle of uropod with three spines and endopod unserrated on inner edge; telson with one pair of minute lateral spines .. *L. mancus* Sars, 1873—Brazil
– Peduncle of uropod with nine spines and endopod serrated on inner edge; telson with two pairs of slender lateral spines *L. mancoides* Băcescu–Mester, 1967—Brazil
5 Telson excluding terminal spines slightly longer than fifth abdominal somite and lacking lateral spines; integument uniformly denticulate *L. vercoi* Hale, 1928—Australia
– Telson excluding terminal spines much shorter than fifth abdominal somite with at least one pair of lateral spines; integument variable but not uniformly denticulate .. 6
6 Telson with no distinct post-anal part, anus elevated and protruding *L. crassicaudus* Zimmer, 1907—Antarctic
– Telson with distinct post-anal part, not elevated nor protruding .. 7
7 Terminal third or less of telson abruptly shallower than rest and midpart carinate dorsolaterally around a shallow concavity .. adult ♂ *L. gilli* sp. nov.
– Terminal part of telson smoothly tapering or abruptly shallower but not carinate middorsally .. 8
8 Anterolateral edge of carapace crenulate .. 9
– Anterolateral edge of carapace serrate or dentate .. 10
9 Telson at least as long as telsonic somite with three pairs of lateral spines; antenna 1 much less than half length of carapace *L. vemae* Băcescu–Mester, 1967—Western Atlantic
– Telson distinctly shorter than telsonic somite with one pair of lateral spines; antenna 1 at least half length of carapace .. *L. attenuatus* sp. nov.
10 Denticles present on pseudorostral lobes as well as on anterolateral edge of carapace 11
– Carapace entirely without denticles except at anterolateral edge .. 12
11 Exopods absent from pereiopod 3; telson with four pairs of long lateral spines and smoothly tapering from base to tip .. ♀ and immature ♂ *L. gilli* sp. nov.
– Exopods present on pereiopod 3; telson with no more than three pairs of short lateral spines and abruptly narrower at tip .. *L. faurei* sp. nov.

12 Telson including terminal spines about a third as long as peduncle of uropod *L. profundus* Jones, 1969—Tasman Sea
– Telson including terminal spines about half as long as peduncle of uropod or more .. 13
13 Endopod of uropod very slightly shorter than peduncle, first segment almost as long as next two together; basis of maxilliped 3 hardly longer than rest of limb *L. chileanus* Bäcescu-Mester, 1967—Chile
– Endopod of uropod no more than two-thirds length of peduncle, segments subequal in length; basis of maxilliped 3 distinctly longer than rest of limb 14
14 Telson about twice as long as deep; exopods of pereiopods 3 and 4 of female about a tenth length of basis; anterolateral edge of carapace regularly and deeply serrate *L. recalvastrus* Hale, 1945—Australia
– Telson less than twice as long as deep; first segment of exopods of pereiopods 3 and 4 more than a quarter length of basis in female (male unknown); anterolateral edge of carapace shallowly and unevenly dentate *L. azaniensis* Jones, 1969—off Kenya

Leptostylis gilli sp. nov.

Figs 27–28

Records

			sub-adult ♂	adult ♂	♂	ovig. ♀	♀	no. of total	records
SWD	28°S 15°E	170 m					2	2	1
WCD	33°S 17°E–34°S 18°E	68–200 m	1	1		3		5	4
LBT	32°S 17°E–32°S 18°E	30–280 m	8	42	2	21	103	176	6
SST	34°S 21°E–35°S 22°E	50–200 m	5	6	2	36	10	59	5
SCD	34°S 22°E–34°S 25°E	106–183 m	2	1	1		4	8	5

Holotype

Ovigerous female, in the South African Museum, SAM–A15736, collected by UCT during the LBT transect, 24 September 1972. Type locality: 200 m, on the Lambert's Bay transect (32°04′S 17°12′E). UCT station number LBT 67F.

Etymology

This species is named after a friend called Gilly.

Description

Ovigerous female, holotype, length 5,9 mm. Integument very thin, delicate, somewhat reticulate and minutely denticulate with a few short hairs on carapace. Carapace (Fig. 27A) about one and a half times as long as deep, slightly furrowed laterally and covered with small denticles (difficult to see in newly moulted animals). Antennal notch small but evident, anterolateral angle small and rectangular, minutely serrate below. Pseudorostral lobes short and rounded, slightly upturned, with a single row of denticles laterally. Eyelobe (Fig. 27B) small, triangular, eyeless.

Pereion less than half length of carapace, first two somites narrow and the third fairly wide. Abdominal somites relatively stout, subcylindrical; fifth almost as long as peduncle of uropod. Abdomen longer than cephalothorax by one somite.

Antenna 1 (Fig. 27C) of moderate length, first segment subequal in length to next two subequal segments together. Flagellum 4-segmented and accessory flagellum 2-segmented. Antenna 2 (Fig. 27D) short and 3-segmented.

Basis of maxilliped 3 (Fig. 27E) about one and a half times as long as rest of limb; ischium, merus and carpus subequal in length; propodus and dactyl slightly longer and more slender.

Pereiopod 1 (Fig. 27F) very long and slender, basis less than half length of rest of limb. Ischium and merus short, subequal in length; carpus long, propodus longer, subequal in length to merus and carpus together; dactyl short. Basis of pereiopod 2 (Fig. 27G) fairly broad, hardly half length of rest of limb. Ischium very short; merus plus carpus subequal in length to propodus plus dactyl. Pereiopods 3 (Fig. 27H) and 4 similar, pereiopod 3 slightly the longer; exopods absent. Merus and carpus subequal in length, propodus and dactyl both small. Merus and carpus of pereiopod 5 relatively large.

Telsonic somite (Fig. 27J) slightly longer than telson (excluding terminal spines), with two pairs of small spines dorsally. Telson evenly tapering from base; post-anal part slightly longer than pre-anal (Fig. 27I) with four pairs of stout spines and two or three pairs of very slender spines laterally. Terminal spines long. Peduncle of uropod slightly more than twice length of telson with several small spines on inner edge. Endopod of uropod longer than exopod by one segment and three-quarters length of peduncle; first segment of endopod much longer than next two together.

Adult and *subadult males*, *paratypes*, lengths 6,2 and 5,7 mm. All adult males are very delicate and none is undamaged. Thus the figures and descriptions of the whole animal (Figs 28A–B) are of a subadult male, which as far as can be seen differs from the adults only in the telson. Figures 28C–J are of an adult male paratype. The males differ from the females as follows: anterolateral angle and antennal notch (Fig. 28A) wanting; ventrolateral edge of carapace with several large spines. Eyelobe elevated somewhat above level of pseudorostral lobes (Fig. 28B). Pereion not as deep and first somite obscured laterally by posterior expansion of carapace. Fifth abdominal somite shorter.

Antenna 1 (Fig. 28C) clubbed; third segment short and broad, bearing numerous sensory setae. Accessory flagellum longer and 4-segmented. Flagellum of antenna 2 not reaching end of thorax. Basis of maxilliped 3 (Fig. 28D) curved, slightly longer. Segments distal to basis missing from pereiopod 1 in all cases. Basis of pereiopod 2 (Fig. 28E) longer, merus more slender. Exopod very well developed. Pereiopods 3 (Fig. 28F) and 4 with segments distal to basis less stout. Rami of pleopod 1 (Fig. 28G) short and 1-segmented. Only the inner ramus of pleopod 2 (Fig. 28H) developed. Both pleopods strongly setose.

Telson slightly longer, post-anal part (Fig. 28I) much longer, shallower and abruptly narrowed at tip with a single pair of terminal spines; keeled dorsally around a shallow concavity. Peduncle of uropod (Fig. 28J) slightly stouter and more strongly armed with minute denticles between the spines.

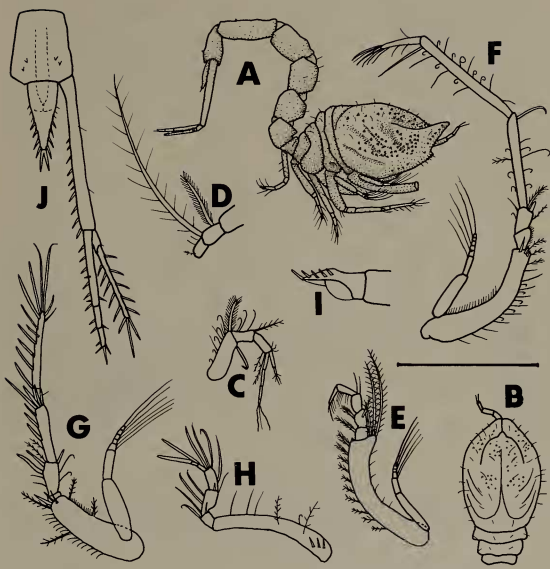

Fig. 27. *Leptostylis gilli* sp. nov.
Ovigerous female. A. Lateral view. B. Dorsal view of cephalothorax. C. Antenna 1. D. Antenna 2. E. Maxilliped 3. F. Pereiopod 1. G. Pereiopod 2. H. Pereiopod 3. I. Telson in lateral view. J. Uropod and telson.
Scale line = 2 mm for A–B; 1 mm for C–J.

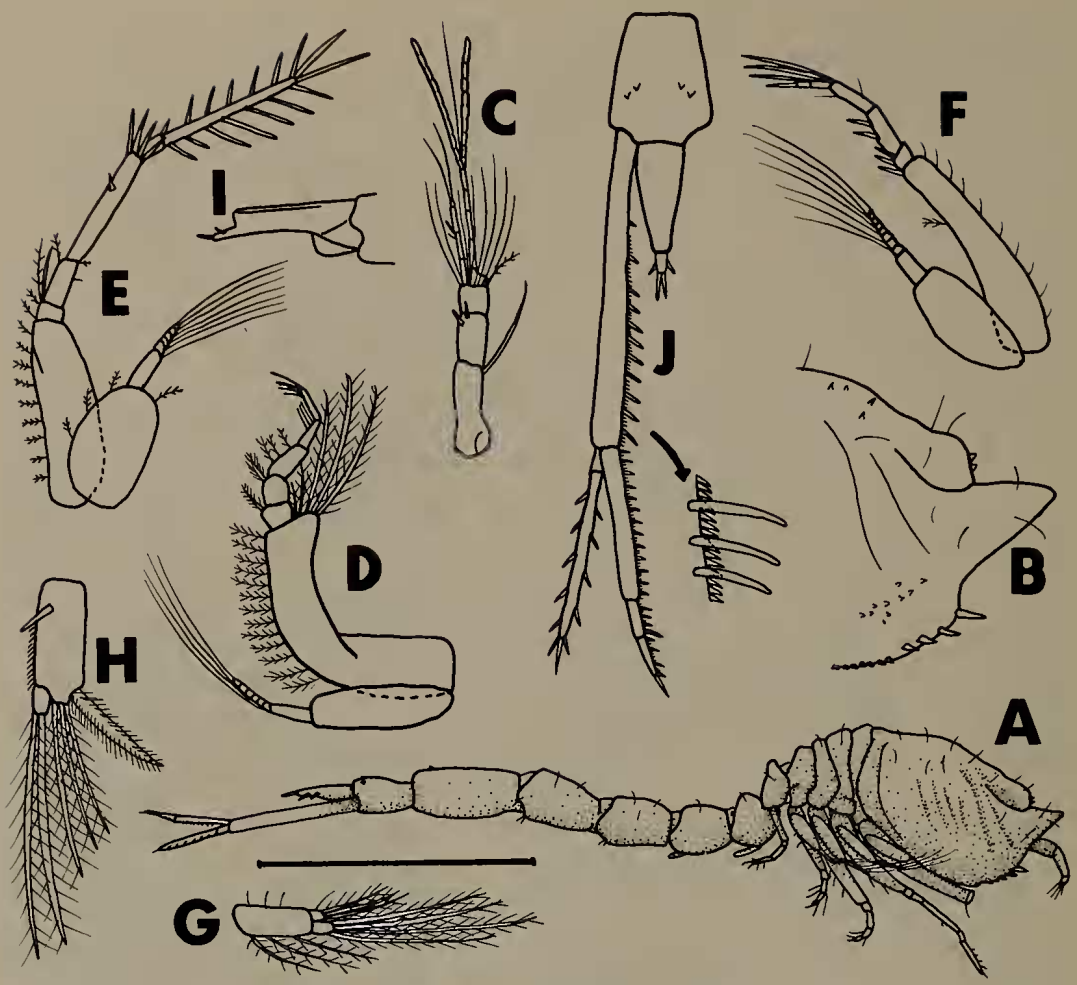

Fig. 28. *Leptostylis gilli* sp. nov.
Subadult male. A. Lateral view. B. Detail of anterior tip of carapace.
Adult male. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 2. F. Pereiopod 3. G. Pleopod 1. H. Pleopod 2. I. Telson in lateral view. J. Uropod and telson.
Scale line = 2 mm for A; 1 mm for B–J.

First segment of endopod longer.

Length

Adult male about 5,8–6,8 mm
Ovigerous female 4,2–6,8 mm

Remarks

In many respects, particularly in the nature of the telson in the adult male and the denticulation of the carapace, this species shows a greater resemblance to *Dimorphostylis* than to *Leptostylis*. But the unwidened bases of pereiopods 1 to 4 and the short flagellum of the second antenna in adult males, together with the poorly developed pleopods, require it to be placed in *Leptostylis*. Also,

the third segment of antenna 1 in adult males is typical of *Leptostylis*, although it should be pointed out that this character is approached in several species of *Dimorphostylis*, so that the genera are obviously very close.

Within *Leptostylis*, *L. gilli* most closely approaches *L. crassicaudus* Zimmer, 1907, from the Antarctic, but the latter lacks denticles and folds on the carapace, which is much larger and stouter and lacks an anterolateral angle. Further, the peduncle of the uropod and first segment of the endopod are considerably shorter in *L. crassicaudus* and the telson differs from that of *L. gilli*.

Distribution

Known from Lüderitz to Port Elizabeth at depths from 30 to 280 m.

Leptostylis faurei sp. nov.

Fig 29.

Records

SAM 34°S 17°E 800 m 3 subadult ♂♂, 5 ♂♂, 2 adult ♀♀, 4 ♀♀ (1 record)

Holotype

Subadult male, in the South African Museum, SAM–A15737, collected by the SAM in about 1900. Type locality: 800 m, off the Cape Peninsula (34°25′S 17°45′E). SAM station number SAM–A10602 (PF 17440).

Etymology

This species is named for the R.S. *Pieter Faure*.

Description

Subadult male, *holotype*, length 8,0 mm. Integument lightly calcified and reticulate. Carapace (Fig. 29A) slightly less than twice as long as deep, minutely reticulate with a longitudinal row of denticles laterally on the pseudorostrum and a few scattered on the eyelobe. Pseudorostrum short and pointed; anterolateral angle and antennal notch wanting; ventrolateral edge with a row of strong, sharp spines. Eyelobe (Fig. 29B) short, rounded, eyeless.

Pereion less than half length of carapace; first somite obscured laterally by posterior extension of carapace, the rest narrow. Abdominal somites subcylindrical, together longer than cephalothorax by two somites; fifth subequal in length to peduncle of uropod.

First segment of antenna 1 (Fig. 29C) shorter than next two together; second and third short and broad, third with a few sensory setae. Flagellum 5-segmented and accessory flagellum 3-segmented.

Basis of maxilliped 3 (Fig. 29D) large and stout, slightly less than twice length of remaining segments together. Ischium small, merus slightly longer; last three segments fairly stout and cylindrical.

Basis of pereiopod 1 (Fig. 29E) half as long as rest of limb with a row of small spines on lower edge. Ischium and merus small, subequal in length.

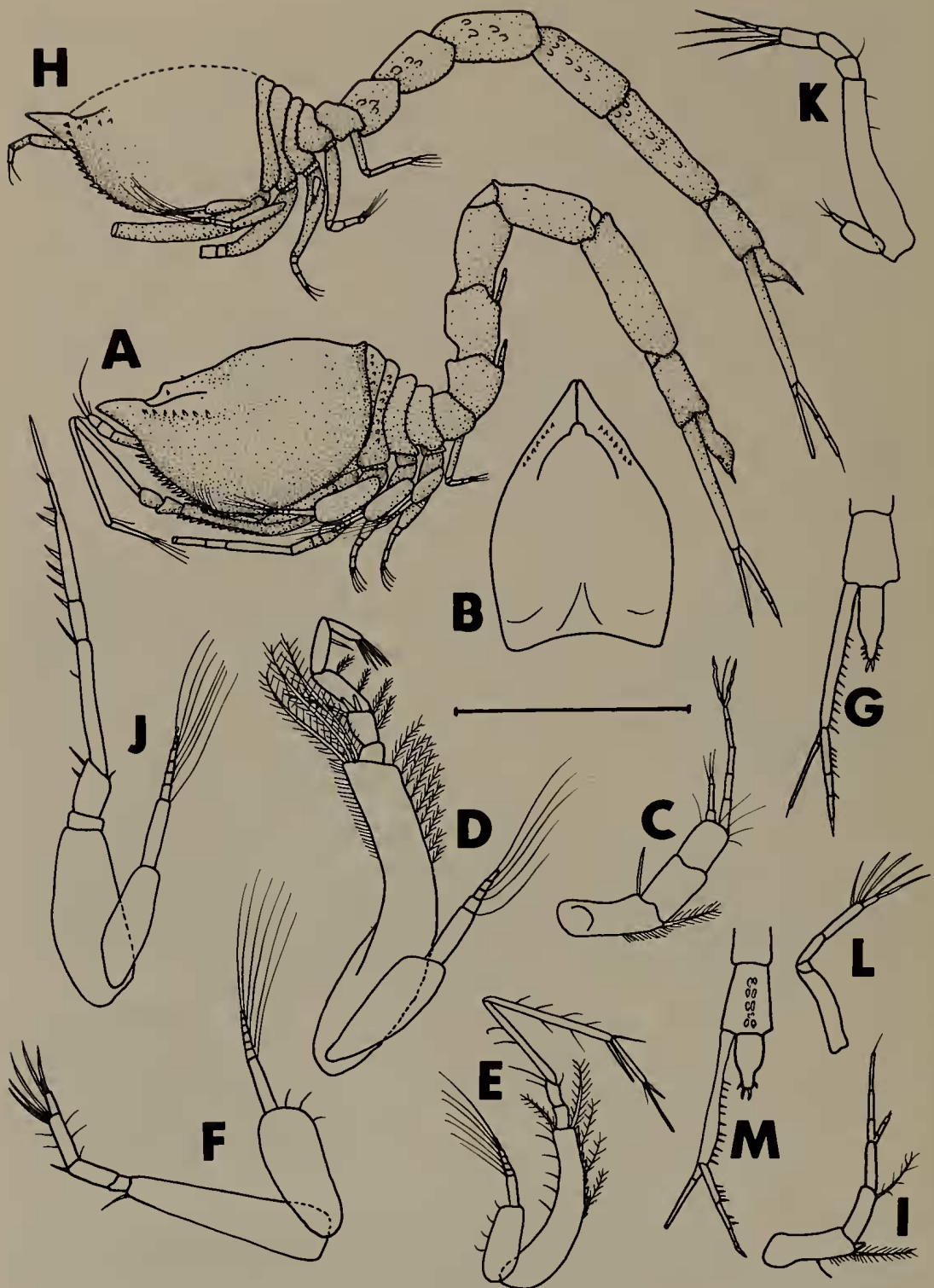

Fig. 29. *Leptostylis faurei* sp. nov.
Subadult male. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 3. G. Uropod and telson.
Adult female. H. Lateral view. I. Antenna 1. J. Pereiopod 2. K. Pereiopod 3. L. Pereiopod 5. M. Uropod and telson.
Scale line = 2 mm for A–B, H; 1 mm for C–G, I–M.

Carpus and propodus very slender, carpus slightly the shorter. Dactyl short and slender. Distal segments of pereiopod 2 missing. Bases of pereiopods 3 (Fig. 29F) and 4 not much longer than remaining segments together, exopods very large. Pereiopod 5 small, basis short.

Telson (Fig. 29G) subequal in length to telsonic somite with three pairs of small spines laterally and one terminally. Peduncle of uropod nearly twice length of telson, half as long again as endopod. Endopod slightly longer than exopod, first segment subequal in length to next two together.

Adult female, paratype, length 7,4 mm. In two pieces, and badly damaged. Fig. 29H is a reconstruction. As male, except as follows: pseudorostral lobes slightly sharper, spination of ventrolateral edge of carapace continuous on to pseudorostral lobes. Carapace apparently not produced posteriorly. Abdomen relatively shorter and peduncle of uropod slightly longer.

Segments 2 and 3 of antenna 1 longer and more slender. Ischium of maxilliped 3 shorter and wider. Distal segments of pereiopod 1 missing. Basis of pereiopod 2 (Fig. 29J) fairly stout, half length of rest of limb; ischium very short, merus longer and stout; carpus little shorter than basis and slightly longer than dactyl. Exopods present on pereiopod 3 and absent from pereiopod 4. Merus and carpus of pereiopod 5 (Fig. 29L) relatively large.

Telson (Fig. 29K) shorter than telsonic somite with one pair of lateral spines.

Length

Subadult male 7,4–9,0 mm
Adult female 7,4 mm

Remarks

L. faurei is a typical member of the genus. It is most similar to *L. azaniensis* Jones, 1969, and is also close to *L. recalvastrus* Hale, 1945, *L. attenuatus* sp. nov. and *L. gilli* sp. nov. It is the only species in which an exopod is present on pereiopod 3 but not on pereiopod 4 in the female. The presence in *L. faurei* of a row of small spines on the pseudorostrum further distinguished it from *L. azaniensis* and *L. recalvastrus*; the smooth carapace distinguishes it from *L. gilli* and the much shorter abdomen distinguishes it from *L. attenuatus*.

Distribution

Known from a single sample from 800 m off the Cape Peninsula.

Leptostylis attenuatus sp. nov.

Fig. 30

Records

SM	27°S 32°E–30°S 30°E	800–1 000 m	3 ovig. ♀♀ (2 records)
SAM	34°S 17°E	800 m	3 subadult ♂♂ (1 record)

Holotype

Ovigerous female, in the South African Museum, SAM–A15738, collected by the SAM, 17 May 1977. Type locality: 1 000 m, off Durban (30°14'S 31°27'E). SAM station number SM 151.

Etymology

Attenuare (L)—to make thin, referring to the elongate body.

Description

Ovigerous female, *holotype*, length 4,5 mm. Integument smooth and well calcified with minute reticulations; abdomen with several extremely long and fairly stout setae. Carapace (Fig. 30A) less than twice as long as deep, smoothly arched dorsally; anterolateral angle and antennal notch wanting, ventrolateral edge strongly crenellate. Pseudorostral lobes short, pointed anteriorly, bearing four or five small denticles in a longitudinal row laterally. Eyelobe (Fig. 30B) small, rounded and eyeless.

Pereion subequal in length to carapace; first three somites ridged transversely, last two smooth. Cephalothorax hardly longer than first four abdominal somites together. Abdominal somites elongate, with some clear patches anteriorly; last four slightly keeled ventrolaterally.

Antenna 1 (Fig. 30C) extremely long, visible part more than half length of carapace; segments subequal in length. Flagellum very long and accessory flagellum short; both 3-segmented.

Basis of maxilliped 3 (Fig. 30D) no longer than rest of limb; remaining segments fairly stout.

Distal segments of pereiopod 1 missing. Last three segments of pereiopod 2 and distal segments of pereiopod 3 missing from all females. Basis of pereiopod 4 slender, longer than remaining segments together. Pereiopod 5 much smaller and more slender.

Telson and distal tips of rami missing from holotype. Uropods and telson in Fig. 30J are from an ovigerous female from SM 60. Telson about three-quarters length of telsonic somite with one pair each of lateral and terminal spines. Peduncle of uropod more than twice length of telson with few spines on inner and several long hairs on outer margin. Exopod slightly shorter than peduncle of uropod. Tip of second segment of endopod broken and all of third missing.

Subadult male, length 5,6 mm (SAM–A10602). The specimens of *L. attenuatus* in this sample all have very few spines and setae. This is apparently due to the long period of preservation of very delicate animals.

As female, except as follows: integument lacking hairs but with very small pits. Carapace (Fig. 30F) less arched dorsally and lacking denticles dorsolaterally on pseudorostral lobes (Fig. 30G), which are slightly longer. Pedigerous somites not ridged. Cephalothorax as long as first three and a half abdominal somites together. Fourth and especially fifth abdominal somites very long.

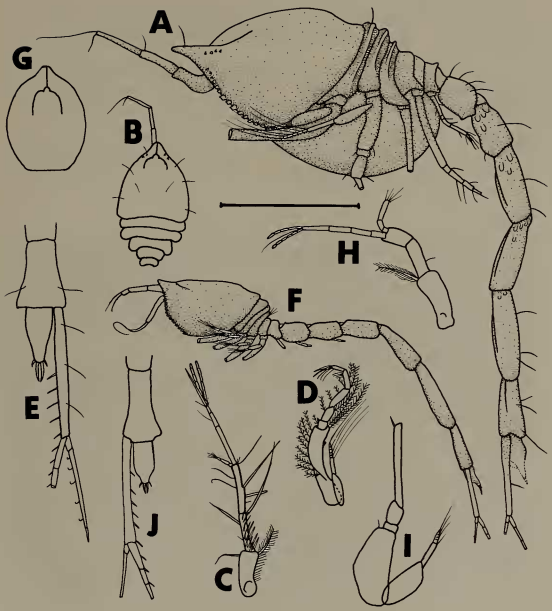

Fig. 30. *Leptostylis attenuatus* sp. nov.
Ovigerous female. A. Lateral view. B. Dorsal view of cephalothorax. C. Antenna 1. D. Maxilliped 3. E. Uropod and telson.
Subadult male. F. Lateral view. G. Dorsal view of carapace. H. Antenna 1. I. Pereiopod 2. J. Uropod and telson.
Scale line = 2 mm for B, F–G; 1 mm for A, C–D; 0,5 mm for E, H–J.

Third segment of antenna 1 shorter and rather stouter; flagellum 4-segmented. Carpus of pereiopod 2 (Fig. 30I) subequal in length to basis and ischium together; last two segments missing. Distal segments of other appendages missing.

Telsonic somite (Fig. 30J) longer and peduncle of uropod slightly shorter. Peduncle of uropod two and a half times length of telson. Distal tips of both rami missing.

Length

Subadult male 5,6–5,9 mm
Ovigerous female 4,5–6,2 mm

Remarks

This species is characterized by the combined presence of very long first antennae and crenellate spines on the anterolateral edge of the carapace. It is difficult to be certain that the individuals of all three samples belong to the same species, because some are not very well preserved or strongly calcified. However, the large first antennae and the very long abdomen indicate that the specimens are conspecific.

L. macruroides Stebbing, 1912, known from a single adult male from 800 m off Durban, is most similar to *L. attenuatus*, and the two species may prove to be synonymous. There are several species in the northern hemisphere in which the adult males possess a ventrolateral carina but the females and non-adult males do not. It is possible that *L. macruroides*, which possesses such a carina, is the male of *L. attenuatus*, particulary since the abdomen of both species is very long. The uropods of all individuals are damaged, but do not appear to be very different in the two species. However Stebbing's figures do not indicate that the first antenna of *L. macruroides* is particularly large for the genus, while this is the most distinctive feature of *L. attenuatus*. The telsonic somite is relatively much longer in the subadult male of *L. attenuatus* than in Stebbing's figure of *L. macruroides*. It is therefore probably best to consider the two species distinct, at least until more material becomes available.

Distribution

Known from the southern Mozambique Channel to the Cape Peninsula at depths from 800 to 1 000 m.

Leptostylis macruroides Stebbing, 1912

Leptostylis macruroides Stebbing, 1912: 153–154, pl. 56.

Previous records

Type locality only.

Holotype

Adult male, deposited by Stebbing in the British Museum (Natural History). Type locality: 800 m, off Durban (about 30°S 30°E).

Remarks

This species is known from a single adult male. It is the only member of the genus in the southern hemisphere possessing a crenulate lateral carina running parallel to and slightly above the crenulate anterolateral edge of the carapace. The abdomen is very long. The possible synonymy of *L. macruroides* and *L. attenuatus* sp. nov. is discussed in the remarks on the latter on page 286.

DISTRIBUTION OF THE DIASTYLIDAE

The distribution of diastylid genera is variable. Those predominating in deep waters are cosmopolitan, while shallow-water genera tend to have much narrower geographical ranges.

Of the four deep-water genera, *Leptostylis* predominates at depths between 200 and 2 000 m and has equal representation in northern and southern hemispheres. *Diastylis* and *Makrokylindrus* predominate in the northern hemisphere, the majority of species of *Diastylis* occurring at depths of less than 1 000 m while *Makrokylindrus* predominate at depths between 1 000 and 3 000 m. The apparently larger number of species in these genera in northern waters is at least partly the result of more intensive collecting there. The cumacean fauna of the seas around most of Africa, South America and large parts of the South Pacific is totally unknown.

The geographical distribution of genera predominating at depths of less than 500 m is much narrower. *Dic*, *Colurostylis*, *Anchistylis* and *Diastylopsis* are found mainly or exclusively in southern oceans, while *Brachydiastylis* is a boreal genus. *Paradiastylis and Dimorphostylis* are confined to depths of less than 100 m in the warm waters of the eastern Indo-West-Pacific (with one doubtful species of *Paradiastylis* from 610 m in the Tasman Sea). *Paradiastylis* also includes the only species in the family known to inhabit brackish waters—*P. culicoides* from Chilka Lake in India.

Diastyloides has a wide bathymetric but narrow geographic range, being known from 7 to more than 4 500 m in the central and North Atlantic and the Mediterranean.

Four genera are monotypic. These are *Ekleptostylis* from 100 m in the Bay of Biscay, *Atlantistylis* from 587 to 3 730 m in the mid-Atlantic, *Leptostyloides* from 4 410 to 4 540 m in the Kermadec Trench and *Anchicolurus* from shallow waters off north-western America.

The world distribution of species of diastylids is shown in Table 2. None is yet known from the intertidal zone but otherwise members of the family are widely distributed from 5 to more than 7 000 m. The family shows a degree of amphipolarity. Only 14 per cent of the total number of species is found in the

TABLE 2
Distribution of Diastylidae according to depth and latitude.
Data mainly from Jones (1969).

	0–200 m		<200–>1 000 m		200–2 000 m		>2 000 m		total	
	no.	%	no.	%	no.	%	no.	%	no.	%
N of 70°N	2	1	10	5	0	0	0	0	12	6
50–70°N	6	3	8	4	0	0	5	2	19	9
20–50°N	26	12	24	11	20	9	14	7	84	39
20°N–20°S	16	7	2	1	6	3	6	3	30	14
20–50°S	28	13	3	1	17	8	4	2	52	23
50–70°S	4	2	0	0	6	3	0	0	14	7
S of 70°S	2	1	2	1	4	2	0	0	8	4
Total	4	38	49	23	53	25	29	14	215	100

tropics between 20°N and 20°S, while 54 per cent occur north of 20°N, and 34 per cent south of 20°S, the predominance in the north once again being partly a reflection of collecting effort.

The majority of species (62%) occurs between latitudes of 20° and 50°, indicating a preference for temperate conditions. Nevertheless the very wide depth ranges of many species suggests that the family is generally less depth- (and therefore temperature-) dependent than other families (Day 1978*a*, 1978*b*). Thus the family is cosmopolitan and eurybathyal.

DISTRIBUTION OF THE SOUTHERN AFRICAN DIASTYLIDAE

Most of the eighteen species of diastylids known from southern Africa are from deep water. The entire family may be divided into the following faunistic groups, but the evidence is so scanty that little can be deduced from their distribution:

1. Shallow-water, cool temperate species from the west coast only:
Diastylis namibiae

2. Shallow-water species extending along both west and south coasts:
Dic calmani

3. Shallow-water warm temperate species from both south and east coasts:
Diastylis algoae, Dic formosae, Leptostylis gilli

4. Shallow-water subtropical species from the east coast only:
Dic platytelson

5. Deep-water species from 200 m and more:
   (i) Cape species: *Diastylis hexaceros, Leptostylis faurei, Makrokylindrus bicornis, M. aculeatus*
   (ii) Natal species: *Leptostylis macruroides, Makrokylindrus acanthodes, M. deinotelson, M. mundus, M. fragilis*
   (iii) Species from both Natal and the Cape: *Leptostylis attenuatus, Makrokylindrus spinifer, Vemakylindrus stebbingi.*

As in the Lampropidae (Day 1978*b*), evidence regarding the distribution of deep-water forms (i.e. those from depths greater than 200 m) is too scanty to merit detailed discussion. The collection has been limited to two areas, one off the south-western Cape and one off Natal, so that faunistic boundaries cannot be defined. One species is known only from 550 m and one from 550 to 900 m; all the rest have only been found between 800 and 1 000 m. Since little material is available from 200 to about 500 m, and virtually nothing is known about the fauna below 1 300 m, it is not possible to estimate the depth limits of these species.

Not one of the species found in southern African waters has been recorded elsewhere. However, the composition of the cumacean fauna further north is virtually unknown. There are no species common to southern Africa and tropical west Africa, but on the east coast, many deep-water species may be southern outliers of a tropical Indian Ocean fauna which is as yet unstudied.

Species diversity in the southern African diastylids is low. 3 662 specimens of 16 species in 284 records were examined, giving figures of 14 individuals per record and a specimen : species ratio of 229 : 1. Thus the diastylids are much less diverse than the bodotriids which give figures of 7,5 individuals per record and 147,9 specimens per species. Comparison between the number of species of bodotriid and diastylid suggests that the bodotriids are more successful in shallow waters and the diastylids more successful in deeper waters.

TABLE 3

Comparison of diversity and abundance of families of Cumacea in southern Africa.

	no. of specimens	no. of records	no. of species	individuals per record	specimens per species
Bodotriidae . . .	4 596	607	31	7,5	147,9
Lampropidae . . .	159	37	10	4,3	15,9
Ceratocumatidae . .	10	3	1	3,3	10,0
Gynodiastylidae . .	102	44	7	2,3	14,6
Diastylidae	3 662	284	16	12,9	228,9

A comparison with the other families so far examined (Table 3) suggests that the diastylids are the least diverse, with the highest number of specimens per species, but the most abundant, with the highest number of individuals per record. This high ratio is due largely to *Diastylis algoae*, which accounts for 2 739 specimens or almost 75 per cent of the individuals in the family. *D. algoae*, together with *Dic formosae* (12%) and *Leptostylis gilli* (nearly 7%) account for almost 94 per cent of the individuals, and without these the diversity is of the same order as that shown by the lampropids, ceratocumatids and gynodiastylids. Removal of the most common species in the bodotriids (Day 1978*a*) gives very similar figures.

In conclusion, it is found that the Diastylidae are second only to the Bodotriidae in number of individuals, but are much less diverse.

ACKNOWLEDGEMENTS

I wish to thank Drs B. Kensley and P. A. Hulley of the South African Museum and Mr T. McClurg of the National Institute for Water Research for sorting out and sending me the diastylid material from the collections of their various institutions, and Profs J. H. Day and G. M. Branch for their criticisms of the manuscript. I am particularly grateful to Dr N. S. Jones for his continued assistance, encouragement and helpful discussions.

Publication of this paper was assisted by a grant from the Editorial Board of the University of Cape Town, which is gratefully acknowledged.

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